PROGRAMME GUIDE

BACHELOR OF ENGINEERING
MECANICAL
(B.E. MECH)

***Scheme of Examination (CBCS/ELECTIVE)**
***Detailed Structure of Syllabus**

DR. C.V.RAMAN UNIVERSITY
KARGI ROAD, KOTA, BILASPUR,CHATTISGARH(C.G.)
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BACHELOR OF ENGINEERING

Duration: 48 Months (4 Years)

Eligibility: 12th Pass With PCM

COURSE STRUCTURE OF BE- (GROUP A- ME/CE/IT) SEMESTER Ist														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	**Min Marks**	**Max Marks**	**Min Marks**	**Max Marks**	**Min Marks**				
Theory Group													
3TBPH101	Basic science course	Engineering Physics	100	50	17	20	07	30	15	2	1	0	3
3TBMA102	Basic science course	Mathematics-I	100	50	17	20	07	30	15	2	1	0	3
3TBME103	Engineering science course	Basic Mechanical Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBCE104	Engineering science course	Basic Civil & Engg Mechanics	100	50	17	20	07	30	15	2	1	0	3
3TBCS105	Humanities course	Communication Skills	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3TBPH101	Basic science course	Engineering Physics	50	25	12	25	12	-	-	-	-	**1**	1
3TBME103	Engineering science course	Basic Mechanical Engineering	50	25	12	25	12	-	-	-	-	1	1
3TBCE104	Engineering science course	Basic Civil & Engg Mechanics	50	25	12	25	12	-	-	-	-	1	1
3TBCS105	Humanities course	Communication Skills	50	25	12	25	12	-	-	-	-	1	1
3TBHH106	Mandatory course	Health, Hygiene & Yoga	50	25	12	25	12	-	-	-	-	1	1
3TBRO107	Mandatory course	Rural Outreach	-	-	-	-	-	-	-	-	-	-	0
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / PracticalExam

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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COURSE STRUCTURE OF BE- (GROUP A- ME/CE/IT) SEMESTER IInd														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	Min Marks	Max Marks	Min Marks	**Max Marks**	**Min Marks**				
Theory Group													
3TBCH201	Basic science course	Engineering Chemistry	100	50	17	20	07	30	15	2	1	0	3
3TBMA202	Basic science course	Mathematics-II	100	50	17	20	07	30	15	2	1	0	3
3TBEG203	Engineering science course	Engineering Graphics	100	50	17	20	07	30	15	2	1	0	3
3TBEE204	Engineering science course	Basic Electrical Engineering	100	50	17	20	07	30	15	2	1	0	3
3TBCS205	Engineering science course	Basic Computer Engineering	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3TBCH201	Basic science course	Engineering Chemistry	50	25	12	25	12	-	-	-	-	**1**	1
3TBEG203	Engineering science course	Engineering Graphics	50	25	12	25	12	-	-	-	-	1	1
3TBEE204	Engineering science course	Basic Electrical Engineering	50	25	12	25	12	-	-	-	-	1	1
3TBCS205	Engineering science course	Basic Computer Engineering	50	25	12	25	12	-	-	-	-	1	1
3TBMP206	Engineering science course	Manufacturing Practices	50	25	12	25	12	-	-	-	-	1	1
3TBED207	Mandatory course	Entrepreneurship development	-	-	-	-	-	-	-	-	-	-	0
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / PracticalExam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER IIIrd														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	Min Marks	Max Marks	Min Marks	**Max Marks**	**Min Marks**				
Theory Group													
3TBBE-301	Basic course	Mathematics-III	100	50	17	20	07	30	15	2	1	0	3
3TBME-302	Professional Core	Material Technology	100	50	17	20	07	30	15	2	1	0	3
3TBME-303	Professional Core	Strength of Material	100	50	17	20	07	30	15	2	1	0	3
3TBME-304	Professional Core	Applied Thermodynamics	100	50	17	20	07	30	15	2	1	0	3
3TBME-305	Professional Core	Manufacturing Process	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME-303	Professional Core	Strength of Material	50	25	12			25	12	-	-	**1**	1
3TBME-304	Professional Core	Applied Thermodynamics	50	25	12			25	12	-	-	1	1
3TBME-305	Professional Core	Manufacturing Process	50	25	12			25	12	-	-	1	1
3TBME-306	Professional Core	Software Lab-I (C++)	50	25	12			25	12	-	-	1	1
Skill Courses				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3STME-307/ 3STCE- 307	Skill Enhancement	Skill Elective-I	50	-	-	25	12	25	12	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / PracticalExam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50% Skill Elective I – Choose any one from the following

3STME- 307 (Basic Automobile Maintenance) 3STCE- 307 (Water Harvesting & Management)

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER IVth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBBE 401	Mandatory course	Energy & Environmental Engg.	100	50	17	20	07	30	15	2	1	0	3
3TBME 402	Professional Core	Instrumentation and control	100	50	17	20	07	30	15	2	1	0	3
3TBME 403	Professional Core	Theory of machine	100	50	17	20	07	30	15	2	1	0	3
3TBME 404	Professional Core	Fluid mechanics – I	100	50	17	20	07	30	15	2	1	0	3
3TBME 405	Professional Core	Machine drawing & CAD	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME 402	Professional Core	Instrumentation and control	50	25	12			25	12	-	-	**1**	1
3TBME 403	Professional Core	Theory of machine	50	25	12			25	12	-	-	1	1
3TBME 404	Professional Core	Fluid mechanics – I	50	25	12			25	12	-	-	1	1
3TBME 406	Professional Core	Software Lab II (AUTO- CAD)	50	25	12			25	12	-	-	1	1
Skill Courses				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3STME 407/ 3STEX-407	Skill Enhancement	Skill Elective-II	50	-	-	25	12	25	12	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD L- Lectures T- Tutorials P- Practical
Major- Term End Theory / PracticalExam
Minor- Pre University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%
Skill Elective I – Choose any one from the following
3STME 407-Basic Refrigeration and Air-Conditioning Maintenance 3 STEX-407 Electrical House Wiring

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER Vth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBME 501	Professional Core	Manufacturing Technology	100	50	17	20	07	30	15	2	1	0	3
3TBME 502	Professional Core	Fluid mechanics –II	100	50	17	20	07	30	15	2	1	0	3
3TBME 503	Professional Core	Internal combustion engine	100	50	17	20	07	30	15	2	1	0	3
3TBME 504	Professional Core	Design of machine elements	100	50	17	20	07	30	15	2	1	0	3
3TBME 505	Professional Core	Dynamics of machine	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME 502	Professional Core	Fluid mechanics –II	50	25	12			25	12	-	-	**1**	1
3TBME 503	Professional Core	Internal combustion engine	50	25	12			25	12	-	-	1	1
3TBME 505	Professional Core	Dynamics of machine	50	25	12			25	12	-	-	1	1
3TBME 506	Professional Core	Software Lab III (CAE)	50	25	12			25	12	-	-	1	1
		MOOC	GRADE TO BE AWARDED										
Skill Courses				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3STME 507 / 3STCE-507	Skill Enhancement	Skill Elective-III	50	-	-	25	12	25	12	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / PracticalExam

Minor- Pre University Test

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Skill Elective III – Choose any one from the following

3 STME 507 CNC Programming & Machining

3 STCE-507 Waste management

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER VIth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	**Max Marks**	**Min Marks**				
Theory Group													
3TBME 601	Professional Core	Turbo Machinery	100	50	17	20	07	30	15	2	1	0	3
3TBME 602	Management course	Entrepreneurship and management concept	100	50	17	20	07	30	15	2	1	0	3
3TBME 603	Professional Core	Renewable energy	100	50	17	20	07	30	15	2	1	0	3
3TBME 604	Professional Core	Industrial engineering	100	50	17	20	07	30	15	2	1	0	3
3TBME 605	Professional Core	Heat and mass transfer	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME 603	Professional Core	Renewable energy	50	25	12			25	12	-	-	**1**	1
3TBME 604	Professional Core	Industrial engineering	50	25	12			25	12	-	-	1	1
3TBME 605	Professional Core	Heat and mass transfer	50	25	12			25	12	-	-	1	1
3TBME 606	Professional Core	Software Lab IV (CATIA)	50	25	12			25	12	-	-	1	1
Skill Courses				**Term End Practical Exam**		**Lab Performance**		**Sessional**					
3STME 607/ 3STCE 607	Skill Enhancement	Skill Elective-IV	50	-	-	25	12	25	12	-	-	1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD L- Lectures T- Tutorials P- Practical
Major- Term End Theory / PracticalExam
Minor- Pre University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%
Skill Elective IV – Choose any one from the following
3 STME 607 ANSYS workbench
3 STCE-607 Quantity estimation & bill preparation

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER VIIth

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3TBME 701	Professional Elective	Professional Elective-I	100	50	17	20	07	30	15	2	1	0	3
3TBME 702	Professional Core	Operation research	100	50	17	20	07	30	15	2	1	0	3
3TBME 703	Professional Core	Refrigeration and air conditioning	100	50	17	20	07	30	15	2	1	0	3
3TBME 704	Professional Core	Automobile engineering	100	50	17	20	07	30	15	2	1	0	3
3TBME 705	Professional Core	Mechanical Vibration and Noise Engg.	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME 703	Professional Core	Refrigeration and air conditioning	50	25	12			25	12	-	-	**1**	1
3TBME 704	Professional Core	Automobile engineering	50	25	12			25	12	-	-	1	1
3TBME 705	Professional Core	Mechanical Vibration and Noise Engg.	50	25	12			25	12	-	-	1	1
3TBME 706	Project work	Minor project	50	25	12			25	12	-	-	1	1
3TBME 707	Project work	Industrial training / Internship/IPR	50	25	12			25	12			1	1
Grand Total			**750**							**10**	**5**	**5**	**20**

Minimum Passing Marks are equivalent toGradeD L- Lectures T- Tutorials P- Practical
Major- Term End Theory / PracticalExam
Minor- Pre University Test
Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%
Professional Elective-I (3TBME-701) 3TBME-701 (A) Machine Tools Design.
3TBME-701 (B) Energy Management & Audit. 3TBME-701 (C) Reliability & Maintenance.
3TBME-701 (D) Simulation & Process Modeling

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COURSE STRUCTURE OF BE-MECHANICAL ENGINEERING SEMESTER VIIIth														
Course Details				**External Assessment**		**Internal Assessment**				**Credit Distribution**			**Allotted Credits**
Course Code	**Course Type**	**Course Title**	**Total Marks**	**Major**		**Minor**		**Sessional *****		**L**	**T**	**P**	**Subject wise Distribution**
				Max Marks	Min Marks	Max Marks	Min Marks	**Max Marks**	**Min Marks**				
Theory Group													
3TBME-801	Open Elective	Open Elective	100	50	17	20	07	30	15	2	1	0	3
3TBME 802	Professional Elective	Professional Elective-II	100	50	17	20	07	30	15	2	1	0	3
3TBME 803	Professional Core	CAD / CAM	100	50	17	20	07	30	15	2	1	0	3
3TBME 804	Professional Core	Industrial Robotics	100	50	17	20	07	30	15	2	1	0	3
Practical Group				**Term End Practical Exam**				**Sessional**					
3TBME 803	Professional Core	CAD / CAM	50	25	12			25	12	-	-	**1**	1
3TBME 804	Professional Core	Industrial Robotics.	50	25	12			25	12	-	-	1	1
3TBME 805	Project work	Major project	150	100	50			50	25	-	-	5	5
3TBME 806	Seminar	Educational tour/Training/ Seminar	100	-	-	--	--	100	50	-	-	1	1
Grand Total			**750**							**8**	**4**	**8**	**20**

Minimum Passing Marks are equivalent toGradeD **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / PracticalExam
Minor- Pre University Test
Sessional weight age – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

OpenElective(3TBME-801)
3TBME-801 (A) Power PlantEngg.
3TBME-801 (B) Work Study& Ergonomics
3TBCE-8101 Construction Planning&Management
3TBME-801 (D) Principle ofManagementEconomics

Professional Elective-II(3TBME-802)
3 TBME-802 (A) Machine Design-II
3 TBME-802 (B) Management Information Systems.
3 TBME-802 (C) Design Of heatExchanger
3 TBME-802 (D) Total Quality Management andSQC

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SEMESTER- 1st **Subject Code:3TBPH101**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: ENGINEERING PHYSICS **Theory Min. Marks**:17

COURSE OBJECTIVE:

The objective of this course is to equip the students with standard concepts and tools or an intermediate to advanced level.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Quantum mechanics: Wave nature of particles and the Schrodinger equation Introduction to Quantum mechanics, Wave nature of Particles, operators, Time-dependent and time-independent Schrodinger equation for wave function, Application: Particle in a One-dimensional Box, Born interpretation, Free-particle wave function and wave-packets, vg and vp relation Uncertainty principle.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Wave optics: Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.	Classroom teaching ICT tools and Google classroom
Unit – III	Introduction to solids: Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model (no derivation) and origin of energy bands. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers(ruby, Neodymium),Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Fiber Optics: Light guidance through optical fibre, types of fibre, numerical aperture, V-Number, Fibre dispersion (through ray theory in step index fibre), block diagram of fibre optic communication system. Nuclear Physics: Nuclear composition, mass defect, binding energy, nuclear force, liquid drop model, elementary idea about nuclear fission and fusion.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

Experiments as suggested by the course coordinator.

Course Outcome:

• Gain a knowledge and understanding of fundamental physical concepts in the areas covered in this class.
• Apply an understanding of these concepts to various systems and devises.

• Acquire problem solving skills, mathematical techniques, and the ability to synthesize.
• The ability to formulate, conduct, analyzes and interprets experiments in engineering physics

List of suggestive core experiments: -

1. Biprism, Newton's Rings, Michelsons Interferometer.
2. Resolving Powers –Telescope, Microscope, and Grating.
3. G.M. Counter
4. Spectrometers-R.I., Wavelength, using prism and grating
5. Optical polarization based experiments: Brewster's angle, polar meter etc.
6. Measurements by LASER-Directionality, Numerical aperture, Distance etc.
7. Uses of Potentiometers and Bridges (Electrical)..
8. Experiments connected with diodes and transistor.
9. Measurement of energy band gap of semiconductor.
10. To study Hall effect.
11. Solar cell.
12.To find the width of s single slit by f He-Ne Laser.
13. To determine the numeral aperture (NA) of a Optical Fibre.
14. To determine plank's constant.

Text Books:-

1. Engineering Physics by Navneet Gupta & S.K. Tiwary.
2. A Text Book of Engg Physics – N. Gupta & S.K. Tiwary , Dhanpat Rai & Co. , Delhi

References Books:

1. Engineering Physics- Purnima Swarup Khare, Laxmi Publication
2. Concepts of Modern Physics- Beiser, TMH
3. Solid State Physics by Kittel ,Wiley India
4. Engineering Physics-Fundamentals and Modern Applications – by Purnima Swarup Khare, Infinity Press Publications

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about quantum mechanics and nuclear physics.	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBMA102**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: MATHEMATICS-I **Theory Min. Marks**:17

COURSE OBJECTIVE:

To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions. To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. To develop the tool of ordinary differential equation for learning advanced Engineering Mathematics. To familiarize the student with functions of several variables that is essential in most branches of engineering. To develop the essential tool of matrices and linear algebra in a comprehensive manner.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Definite Integral as a limit .of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations	Classroom teaching ICT tools and Google classroom
Unit – IV	Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.	Classroom teaching ICT tools and Google classroom
Unit - V	Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.	Classroom teaching ICT tools and Google classroom

Course Outcome:

This Syllabus has been designed to equip engineering student s with necessary mathematical tool's to handle mathematical problem in their core subjects. Through this syllabus they will learn many thing about calculus specially first order differential equation , Roles ,Lagrange's concept about existence of derivatives in some interval ,Expansion of a function in an infinite series by Maclaurin's and Taylor theorem , partial derivative of functions through which maxima minima of two variable function application of matrices in solving linear simultaneous equations, Eigen value Eigen vector,Calay-Hamilton theorem to find Inverse of a matrix ,and concept of vector space.

Text Books:-

1. Basic Engineering Mathematics I by H.K. Dass and Verma Ram

References Books:

1. Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Person Education, 2002 (Indian Edition).

2. B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007. Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.
3. S.S. Shastry, Engineering Mathematics, PHI Learning.
4. C.B. Gupta, Engineering Mathematics I & II Mcgraw Hill India, 2015.
5. Engineering Mathematics I by D.C. Agarwal

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about calculus and partial differentiation.	Goal04(quality education)	

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SEMESTER- 1st **Subject Code:3TBME103**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: BASIC MECHANICAL ENGINEERING **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To familiarize with the basic concept of Mechanical Engineering
- To familiarize with the scope of Mechanical Engineering
- To familiarize with the job prospects of Mechanical Engineer.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Materials: Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness , ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.	Classroom teaching ICT tools and Google classroom
Unit – II	Measurement: Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set. Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry,welding etc Introduction to Lathe and Drilling machines and their various operations.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Fluids: Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Thermodynamics: Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy. Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught, steam properties, use of steam tables.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Reciprocating Machines: Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol &Diesel engines. Working principle of compressor.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

At the end of this course students will able to:

- Identify engineering materials, their properties, testing and manufacturing methods encountered in engineering practice.
- Understand Concept of measurement by using measuring instrument Vernier caliper, Micrometer, Dial gauge, Slip gauge etc.
- Understand basics of thermodynamics and components of a thermal power plant
- Understand the construction, operation and performance of different IC engines.

• Understand basics of fluids, their properties and laws of fluid Mechanics.

List of Experiments

1. To verify law of triangle of forces.
2. To verify the Lami's theorem.
3. To verify the law of polygon of forces.
4. To verify the law of lever.
5. To determine the support reactions of a simply supported beam subjected to point loads.
6. To draw the variation of bending moment at a given section in a simply supported beam under a moving point load.
7. To find the coefficient of friction between surfaces of wooden plane and following blocks:
i) Aluminum ii) Tin iii) Glass iv) Asbestos v) Teak ply vi) Sand paper
vii) card board.
8. To determine the coefficient of friction between
(i) Belt and pulley
(ii) Rope and pulley.
9. To study simple jib crane and to determine the internal forces in members of jib crane.
10. To determine the stiffness of helical compression spring.
11. To study lifting machine.
12. To study the lifting machine "second order pulley system" and to draw the following characteristic diagram:
i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
13. To study the lifting machine "Wheel and Differential axle" and to draw the following characteristic diagram:
i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
14. To study the lifting machine "Worm and worm wheel" and to draw the following characteristic diagram:
i. Load-effort diagram
ii. Load- ideal effort diagram
iii. Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
15. To study the lifting machine "Simple screw jack" and to draw the following characteristic diagrams of the machine:
i. Load-effort diagram
ii .Load- ideal effort diagram
iii.Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
16. To study the lifting machine "Modified screw jack" and to draw the following characteristic diagrams of the machine:
i. Load-effort diagram
ii. Load- ideal effort diagram
iii.Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
17. To study the lifting machine "Geared Jib crane" and to draw the following characteristic diagrams of the machine:
i. Load-effort diagram
ii. Load- ideal effort diagram
iii.Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
18. To study the lifting machine "Single Purchase Winch crab" and to draw the following characteristic diagrams of the machine:
i. Load-effort diagram
ii .Load- ideal effort diagram
iii.Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.
19. To study the lifting machine "Double Purchase Winch crab" and to draw the following characteristic diagrams of the machine:
i. Load-effort diagram

ii.Load- ideal effort diagram iii Load-efficiency diagram
Also, to determine the law of machine and the maximum efficiency of machine.

References Books:

1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age .
2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.
3- Nag P.K, Engineering Thermodynamics , TMH .
4- Ganesan , Internal Combustion Engines, TMH .
5- Agrawal C M, Basic Mechanical Engineering, Wiley Publication.
6- Achuthan M , , Engineering Thermodynamics ,PHI.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about characteristics of materials	Goal04(quality education)	

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 1st **Subject Code:3TBCE104**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: BASIC CIVIL & ENGG MECHANICS **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To introduce to student relevance of civil engineering for various engineering applications.
- To introduce to student various elements of buildings and construction materials.
- To introduce to student various methods of land survey and to make him use surveying equipment
- To make student aware of modern investigation techniques in land survey.
- To introduce to student about the water management and transportation engineering.
- Ability to apply knowledge of mathematics, science, and engineering.
- Solve for the resultants of any force systems.
- Determine equivalent force systems.
- Solve the mechanics problems associated with friction forces.
- Obtain the centroid, first moment and second moment of an area.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Building Materials & Construction Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability	Classroom teaching ICT tools and Google classroom
Unit – II	Surveying & Positioning: Introduction to surveying Instruments – levels, thedolites, plane tables and related devices.Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Mapping & sensing: Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Engineering Mechanics Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent Co- planner forces, free diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

At the end of the course, the student will be able to:

- Describe the role of civil engineer in the development of the society and explain relationship of civil engineering

with other branches of engineering and technology.
• Discuss types of buildings and select materials of construction.
• Explain the elements of water supply such as dam, canal and elements of transportation structures.
• Measure heights, distances and angles on ground using basic surveying instruments and plot them on paper.
• Explain the advantages of advances in civil engineering like remote sensing techniques, GIS and GPS.
• Determine the resultant force and moment for a given system of forces

List of Experiments

1. To verify the law of 'POLYGON FORCES'.
2. To find the moment of inertia of a given 'FLYWHEEL'
3. To find the coefficient of friction using 'INCLINED PLANE'.
4. To find the coefficient of friction using 'FRICTION SLIDE APPARATUS'.
5. find the coefficient of friction between 'ROPE & PULLEY'.
6. To verify the forces in member of 'JIB CRANE'.
7. To determine the velocity ratio, mechanical advantage and percentage efficiency in case of a 'SIMPLE SCREW JACK'.
8. To obtain the velocity ratio, mechanical advantage and efficiency of 'DOUBLE PURCHASE WINCH CRAB'.
9. To verify the law of moment using 'BELL CRANK LEVER'.
10. To find out the bending moment at the 'SECTION OF BEAM'.
11. To determine the velocity ratio, mechanical advantage and percentage efficiency in case of a 'MODIFIED SCREW JACK'.

Text Books:-

1. Text book of Engineering Mechanics By R.K. Bansal
2. Text Book of Engineering Mechanics by R.S. Khurmi

References Books:

1. J.L.Meriam and L.G. Kraige, Engineering Mechanics, 7th Ed, John Wiley & Sons, 2012.
2. Timoshenko and Young, Engineering Mechanics, 3rd Ed, McGraw Hill Publishers, 2006.
3. Gere and Timoshenko, Mechanics of Materials, 2nd Ed, CBS Publishers, 2011.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about building construction and surfaces	Goal04(quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 1st **Subject Code:3TBCS105**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: COMMUNICATION SKILLS **Theory Min. Marks:17**

COURSE OBJECTIVE:
The objective of this course is to learn the second language learners ability and to use the four fundamental language skills-reading writing speaking and listening. It will enable the students to speak english correctly and with confidence.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.	Classroom teaching ICT tools and Google classroom
Unit – II	Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	COMMUNICATION: Introduction, Meaning and significance, Process of Communication, Oral and Written Communication, 7 C's of communication, Barriers to communication and ways to overcome them, Importance of communication foe Technical students, non verbal communication	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	DEVELOPING WRITING SKILLS: Planning, Drafting, and Editing, Precise Writing, Precise, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of trouble, laboratory Report, Progress Report.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	BUSINESS CORRESPONDENCE: Importance of business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for Writing Resume, Calling /Sending quotation, Order, Complaint, E-mail and Tender.	Classroom teaching, ICT Based and individual presentation and Google classroom

Topics for the Laboratory:

1. Basic grammar & vocabulary practice (synonyms, antonyms, analogies, sentence completion, correctly spelt words, idioms, proverbs, common errors.
2. Phonetic symbols, pronunciation
3. Listening skills – including listening comprehension
4. Extempore and JAM (Just a minute session)
5. Role play – I
6. Role play – II
7. Body Language
8. Debate
9. Oral presentation – preparation & delivery using audio – visual aids with stress on body language and voice modulations. (Topic to be selected by the instructor)

Course outcome:

Student will develop knowledge, skills and judgment around human communication that facilitate their ability to work

ollaboratively with others. Such skills could include communication competencies such as managing conflict, understanding small group process, active listening, appropriate self disclosure, etc.

References Books:

1. A. J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH.
2. Pub Sanjay Kumarm Pushp Lata, English for Effective Communication, Oxford.
3. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
4. 'Effective Business Communication', Krizan and merrier (Cengage learning)
5. 'Business Correspondence and Report Writing' R.C. Sharma and Krishna Mohan, (Tata Mcgraw Hill)
6. 'Speaking and Writing for Effective Business Communication', Francis Soundararaj (Macmillan)
7. Effective Technical Communication', M Arshaf Rizvi (Tata Mcgraw Hill)

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
	Able to provide speaking and writing skills	Goal04(quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 1st **Subject Code:3TBHH106**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: HEALTH, HYGIENE & YOGA **Theory Min. Marks**:12

COURSE OBJECTIVE:

It is very important for the protection of our health and helps to present the spread of communicable diseases personal hygiene has social and aesthetic values. The provision of hygiene information first impacts on knowledge and then practice. Yoga education helps in self discipline and self control, leading to immense amount of awareness concentration and higher level of consciousness. This course can prepare the students physically & mentally for the integration of their physical, mental and spiritual faculties so that the students can become healthier, saner and more integrated members of the society & of the nation.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Important of nourishment, nourishment and health categorization of nutrients in food, body parts involved in digestion of food nutrients, bad eating habits concept of food nourishment in India. Nutrient value of common Indian food preservation adulteration in food items uncommon food items. Digestible and indigestible food items. Supplement healthy food items.	Classroom teaching and ICT tools
Unit – II	Introduction to diseases and spondelitis, level spondelitis, acidity, gas, constipation, skin diseases high blood pressure, low blood pressure heat diseases, cough and cold, obesity, diabetes. Diseases of the eye, mental disorder.	Classroom teaching and ICT tools
Unit – III	Introduction of Patanjali, Role of yoga in personality development role of yoga in physical development of body.	Classroom teaching and ICT tools
Unit – IV	Preneyam, Anlom, Vilom, Bhramni.	Classroom teaching and ICT tools
Unit - V	Rollingm Warning, Toning of whole body, Asanas – Vajrasan, Shashenkasan, Bakrasen, Gomukhasan, Ardhmatsendrasan, Surya Namaskar, Naukasan, Sarvangasan, Dhanurasan, Chakrasan, Makrasan, Vrikshasan, Mendookasan.	Classroom teaching and ICT tools

Course Outcome:
- The student to have good health.
- Student have good mental hygiene.
- Possess emotional stability.
- Integrated moral values.
- Attain higher level of consciousness.

References Books:
1. Kirkwood G, Rampes H, Tuffrey V, Richardson J, Pilkington K. Yoga for anxiety: A systematic review of the research evidence.Br J Sports Med.2005
2. Shapiro D, Cook IA, Davydov DM, Ottaviani C, Leuchter AF, Abrams M. Yoga as a complementary treatment of depression: Effects of traits and moods on treatment outcome.Evid Based Complement Alternat Med.2007
3. Pilkington K, Kirkwood G, Rampes H, Richardson J. Yoga for Depression: The research evidence.J Affect Disord.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to understand the nutrient value of food.		

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 1st **Subject Code:3TBRO107**

Course: BE Mechanical

SUBJECT: RURAL OUTREACH

COURSE OBJECTIVE:

The main objective of introducing this course is to sensitize students about the socio-cultural aspects of the rural areas parochial to their colleges. Students are expected to observe, investigate and learn about the following aspects of the rural region:

i. Demographics, Literacy, Geographical parameters of the Village.
ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages.
iii. Social/ Cultural aspects ranging from popular dance forms, music and customs of the concerned village.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	This course shall be done by the students in a self-study mode. Study methodology shall comprise of combining field visits, case studies, analyzing policy documents from different government departments, discussions with field officers, active NGO's and so on.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – II	The course will not be listed in the time-table and its activities shall be performed by the student sat any time convenient to them.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – III	The faculty associated with the course shall evaluate the candidate and grade him.	Classroom teaching , ICT tools ,Google classroom and field visit
Unit – IV	For evaluation purpose, students are expected to submit a hand-written summary on the government schemes and policies for the socio-cultural development of the concerned village. This shall be followed by final submission of two case studies covering broad spectrum of socio-cultural issues ranging from life in slums, infant mortality, watershed management, portability of water, animal welfare etc. These case studies (handwritten) shall be submitted to the mentor for the final evaluation of the coursework.	Classroom teaching , ICT tools ,Google classroom and field visit

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 2nd **Subject Code:3TBCH201**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: ENGINEERING CHEMISTRY **Theory Min. Marks**:17

COURSE OBJECTIVE:
The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Molecular Structure & Bonding: VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory,Molecular Orbital of Polyatomic Molecules Electrochemistry: Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch'sLaw, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.	Classroom teaching , ICT tools and Google classroom
Unit – II	Chemical & Phase Equilibria: Phase Diagram for single component system (Water), Phase diagram forBinary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact. Reaction Dynamics: Order, Molecularity, Rate Law, Methods of determining order of reaction (1st&2nd Order).	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Polymers & Polymerization: Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	(i) Lubricants and Lubrication (4 Lectures) Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number and related numerical problems. (ii) Spectroscopic techniques and application (6 Lectures) Principle, Instrumentation & Applications, electronics spectroscopy, Vibrational & Rotational Spectroscopy of diatomic molecules.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	(i) Water – Analysis, Treatments and Industrial Applications (4 Lectures) Sources, Impurities, Hardness & its units, Determination of hardness by EDTA method, Alkalinity & its determination and related numerical problems. (ii) Boiler problem & softening methods (4 Lectures) Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related problems.	Classroom teaching, ICT Based and individual presentation and Google classroom

List of Experiments:

1. To determine the percentage composition of a mixture of Sodium Hydroxide
2. and Sodium Chloride.
3. To determine the amount of Sodium Carbonate in the given mixture of
4. Sodium Carbonate and Sodium Bicarbonate.
5. Determine the amount of Oxalic Acid and Sulphuric Acid/Hydrochloric Acid in one

6. litre of solution given standard Sodium Hydroxide and Potassium Permanganate.
7. 4. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.
8. 5. Argentometric titration one each of Vohlard's method and of Mohr's method.
9. 6. Complexometric Titrations Ca & Mg.
10. 7. Deternimation of dissolved Oxygen in given sample of water.
11. 8. Deterination of calorific value of fuel by Bomb Calorimeter.
12. Determination of Flash Point and Fine Point of lubricant by Abels and Pensky
13. Martin apparatus.

Course Outcome:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels.

The course will enable the student to:

• Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
• Rationalise bulk properties and processes using thermodynamic considerations. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
• List major chemical reactions that are used in the synthesis of molecules

Text Books:-
1. Engineering Chemistry by S.S. Dara
2. Engineering Chemistry by R. Gopalan & Venkappayya & Nagarajan

References Books:

1. Lee, J. D., Author, Concise Inorganic Chemistry, Oxford University Press Alberty.
2. R.A. Physical Chemistry, John Wiley and Sons.
3. N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd. Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology Tata Msgraw Hill.
4. Polymer Science – Ghosh, Tata McGraw Hill

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide knowledge about olymers.	Goal04(quality education)	

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 2nd **Subject Code:3TBMA202**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: MATHEMATICS-II **Theory Min. Marks**:17

COURSE OBJECTIVE:

Introduced effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes. Introduced Fourier Series & Fourier Transform. Introduced the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems. Acquainted the student with mathematical tools available in vector calculus needed various field of science and engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Ordinary differential Equations: Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties	Classroom teaching , ICT tools and Google classroom
Unit – II	Partial Differential Equations: Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients. Method of separation of variable's	Classroom teaching , ICT tools and Google classroom
Unit – III	Fourier series: Fourier Series for Continuous & Discontinuous Functions, Expansion of odd and even periodic functions, Half range Fourier series, Half range sine and cosine series, Parseval's theorem, Fourier transform, Fourier sine and cosine transform	Classroom teaching , ICT tools and Google classroom
Unit – IV	Functions of Complex Variable: Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle)	Classroom teaching , ICT tools and Google classroom
Unit - V	Vector Calculus: Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.	Classroom teaching , ICT tools and Google classroom

Course Outcome:

Today calculus has become the heart of every engineering stream. Through this syllabus student will learn different techniques of solving different kind of higher order ordinary and partial differential equations. Expansion of periodic function in an infinite series of sine and cosine function through Fourier series, Function of complex variable's based on complex number and also vector calculus based on vectors.

Text Books:-

1. Text Book of Engineering Mathematics 3rd Sem. by N.P. Bali & Manish Goyal

References Books:

1. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2013. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons Inc.
2. Micheal Greenberg, Advanced Engineering Mathematics, Second Edition, Person Education, 2002 (Indian Edition).
3. B.V. Rammana, Higher Engineering Mathematics, Tata Msgraw Hill Publishing Company, 2007. Shanti Narayan, A Course of Mathematical Analysis. S.Chand & Co.Delhi.
4.Marwaha, Introduction to Linear Algebra, PHI Learning.

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
	Able to provide knowledge about vector calculus.	Goal04(quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 2nd **Subject Code:3TBEG203**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: ENGINEERING GRAPHICS **Theory Min. Marks**:17

COURSE OBJECTIVE:

- To familiarize with the construction of geometrical figures.
- To familiarize with the projection of 1D, 2D and 3D elements .
- To familiarize with the sectioning of solids and development of surfaces.
- To familiarize with the Preparation and interpretation of building drawing .

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;	Classroom teaching , ICT tools and Google classroom
Unit – II	Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes – Auxiliary Planes,Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views, Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors and fixtures such as WC, bath, sink, shower, etc.	Classroom teaching , ICT tools and Google classroom
Unit – III	Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)	Classroom teaching , ICT tools and Google classroom
Unit – IV	Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;	Classroom teaching , ICT tools and Google classroom
Unit - V	Overview of Computer Graphics covering, listing the computer technologies that impact ongraphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (ButtonBars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used inCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]Customisation & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and to learning; Orthographic constraints, Snap to objects manually and automatically, Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles. Use of solid modelling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling;Introduction to Building Information Modelling (BIM).	Classroom teaching , ICT tools and Google classroom

List of Experiments:

Drawing for topics covered in the theory as suggested by the course coordinator.

Course outcome:

• Introduction to engineering design and its place in society
• Exposure to the visual aspects of engineering design
• Exposure to engineering graphics standards
• Exposure to solid modelling
• Exposure to creating working drawings
• Ability to draw projections and analysing multiple views of object.

Text Books:-
1. Engineering Drawing by R.K. Dhawan

References Books:

1. N.D. Bhatt and V. M. Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.
2. James Leach, AutoCAD 2015 Instructor, SDC Publications.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge of drawing scales and Computer Aided Design	Goal04(quality education)	

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 2nd **Subject Code:3TBEE204**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: BASIC ELECTRICAL ENGINEERING **Theory Min. Marks**:17

COURSE OBJECTIVE:

1. To provide knowledge of basic concepts related to electrical engineering.
2. To provide knowledge of basic Circuits: 1- phase AC Circuits, 3-phase AC Circuits, Magnetic Circuits, Electrical Machines

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	D.C. Circuits: Units and dimensions, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta circuits.	Classroom teaching , ICT tools and Google classroom
Unit – II	1- phase AC Circuits: Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	3-phase AC Circuits: Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Magnetic Circuits: Basic definitions, magnetization characteristics of Ferro magnetic materials, self inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Single phase transformer- general construction, working principle, e.m.f. equation, open circuit and short circuit test	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Electrical Machines: D.C. Motor & D.C. Generator, Three phase Induction motor and SynchronousMachines, their general construction, working principle, emf equation and applications. Types of losses occurring in electrical machines	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

After successful completion of course,
• Students are expected to possess an in-depth understanding and Knowledge of 1- phase AC Circuits, 3-phase AC Circuits, Magnetic Circuits, Electrical Machines
• Develop the concepts of basic electrical engineering for all the undergraduate students of different branches of engineering.

List of Experiments:

• Verifications of Thevenin's Superposition theorem.
• Study of Transformer, name plate rating, determination of rayio and polarity.

• Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
• Separation of resistance and inductance of choke coil.
• Measurement of various line & phase quantities for a 3-phase circuit.
• Identification of different Electronics components.
• Observing input and output waveforms of rectifiers.
• Transistor application as amplifier and switch.
• Verification of truth table for various gates.

Text Books:-

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.

References Books:

1. Basic Electrical Engineering by S.K. Sahdev & R.K.Chaturvedi
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013 .
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall, 2014.
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012.
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. Bharti Dwivedi, Fundamentals of Electrical Engineering, Wilkey India,2013.
7. Sanjeev Sharma, Basic Electrical Engineering, I.K. International.
8. Basic Electrical Engineering by V N Mittle & Arvind Mittal

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Identification of several machines. Achieving the knowledge of speed control of dc motors .	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBCS205**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: BASIC COMPUTER ENGINEERING **Theory Min. Marks**:17

COURSE OBJECTIVE:

By the end of this course, the student will be able to:-

1. Analysing problems, and designing and implementing algorithmic solutions.
2. Solving problems properly, achieving an implementation that is correct, effective and efficient.
3. Using computers at user level, including operative systems and programming environments.
4. Knowledge of computer equipment, including both hardware and software.
5. Identifying information needs to solve problems, recovering information and applying it to the resolution.
6. Opportunity to learn key concepts of computer, as well as fundamentals and applications of computer.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Computer: Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc. Operating System: Definition, Function, Types, Management of File, Process & Memory. Introdcution to MS word, MS powerpoint, MS Excel	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Introduction to Algorithms, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming.Introduction to C++: Character Set, Tokens, Precedence and Associatively, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions. Introduction to Data Structures.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Introduction to Internet, World Wide Web, Ecommerce Computer Security Basics: Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, ,Logic bombs, Hacking Spamming, Cyber Defamation , pharming Security measures Firewall, Computer Ethics & Good Practices, Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Data base Management System: Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages.	Classroom teaching, ICT Based and individual presentation and Google classroom

	Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing	

List of Experiment

1. Study and practice of Internal & External DOS commands.
2. WAP to illustrate Arithmetic expressions
3. WAP to illustrate Arrays
4. WAP to illustrate functions.
5. Write program to illustrate Conditional Statements
6. Write program to illustrate Loop Statements..
7. WAP to illustrate constructor & Destructor
8. WAP to illustrate Object and classes
9. WAP to illustrate Operator overloading
10. WAP to illustrate Function overloading
11. WAP to illustrate Derived classes & Inheritance
12. WAP to insert and Delete end Element from the stack
13. WAP to insert and delete end element from the Queue

Course outcome:

By the end of this course, the student will

• Analysing problems, and designing and implementing algorithmic solutions.
• Solving problems properly, achieving an implementation that is correct, effective and efficient.
• Using computers at user level, including operative systems and programming environments.
• Knowledge of computer equipment, including both hardware and software.
• Identifying information needs to solve problems, recovering information and applying it to the resolution.
• Opportunity to learn key concepts of computer, as well as fundamentals and applications of computer.

References Books:

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Introduction of Computers : Peter Norton, TMH
3. Kerninghan & Ritchie “The C programming language”, PHI
4. Kanetkar Y. “Let us C”, BPB.
5. Microsoft_Office_2007_Illusrated_Windows_XP_Edition_Introductory by David W. Beskeen, Jennifer Duffy.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Network Engineer	Able to understand the knowledge of computer peripheral	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBMP206**
Course: BE Mechanical **Theory Max. Marks:25**
SUBJECT: MANUFACTURING PRACTICES **Theory Min. Marks**:12

COURSE OBJECTIVE:

• To familiarize with the basics of tool sand equipments used in fitting, carpentry, sheetmetal, welding and smithy
• To familiarize with the production of simple models in the above trades.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	FITTING: Tools&Equipments–Practiceinfiling.MakingVeeJoints,Square,Dovetailjoints and Keymaking-plumbing. SuggestedMiniproject–Assembly of simple I.C.engines	Classroom teaching , ICT tools and Google classroom
Unit – II	CARPENTRY: Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints. Suggested Mini project-model of a single door window frame.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	SHEETMETAL: Toolsandequipments–practice.Makingrectangulartray,hopper,scoop,etc. Suggested Mini project-Fabrication of a small cabinet, dust bin, etc.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Tools and equipments– Arcweldingofbuttjoint,Lapjoint,Teefillet.Demonstrationofgaswelding, TIG & MIG welding.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	SMITHY: Tools and Equipments– Making simple parts like hexagonal headed bolt, chisel. FOUNDRY: Tools and Equipments, Mould making, conducting casting operation of a job.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course outcome:

• On completion of this course, students will be able to
• Make half lap joint and dovetail joint in carpentry.
• Make welded lap joint, butt joint and T-joint.
• Prepare sand mould for cube, conical bush, pipes and V pulley.
• Fabricate parts like tray, frustum of cone and square box in sheet metal.

References Books:

1. S. Hazara Choudhary, Gopal. T.V. Kumar T and Murali G. “A first course on workshop practice – theory, practice and work book”, Suma Publications, Chennai, 2005.

2. Kannaiah. P and Narayanan. K.C. “Manual on workshop practice”, Scitech Publications.

3. Venkatachalpathy. V.S. “First year Engineering Workshop Practice”, Ramalinga Publications.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to get the knowledge about tools, equipment and foundry	Goal04(quality education) Goal09(Industry, Innovation & Infrastructure)	

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SEMESTER- 2nd **Subject Code:3TBED207**

Course: BE Mechanical

SUBJECT: ENTREPRENEURSHIP DEVELOPMENT

COURSE OBJECTIVE:

Understanding basic concepts of entrepreneurship and key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Entrepreneurship-Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of self confidence. Communication skills, Capacity to influence, leadership.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Project Report- Evaluation of selected process. Detailed project report - Preparation of main part of project report pointing out necessary and viability.Selecting the form of Organization: Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organization.Economic management -Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, Cost and Price determination, Calculation of Profits, keeping of accounts.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Production management - Methods of purchase. Management of movable assets/goods. Quality management. Employee management. Packing. Marketing management Sales and the art of selling. Understanding the market and market policy. Consumer management. Time management.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Role of regulatory institutions - district industry centre, pollution control board, food and drug administration, special study of electricity development and municipal corporation. Role of development organizations, khadi & village Commission/ Board, State Finance Corporation, scheduled banks, MP Women's Economics Development Corporation. Self-employment-oriented schemes, Prime Minister's Employment schemes, Golden Jubilee Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self- employment scheme.Various grant schemes - Cost-of-Capital grant, interest grant, exemption from entry tax, project report, reimbursement grant, etc. Special incentives for women entrepreneurs, prospects 8s possibilities. Schemes of Tribal Finance Development Corporation, schemes of Antyavasai Corporation, schemes of Backward Class and Minorities Finance Development Corporation.	Classroom teaching, ICT Based and individual presentation and Google classroom

Course Outcome:

Understanding basic concepts in the area of entrepreneurship, understanding the stages of the entrepreneurial process, adopting of the key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

Reference Books:

1. Fundamental of Entrepreneurship : Sangram Kesari Mohanty (PHI Publications)
2. Udhyamita Vikas : U.C Gupta (Kailash Prakashan)
3. Entrepreneurship Dvenelopment : D. Acharya (Himalya Publication House)

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
Supervisor	Able to understand the concept of motivation	Goal04(quality education)	Social enterpreneur

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code: 3TBBE- 301**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: MATHEMATICS-III **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

• To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
• To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation which are used in various branches of engineering?
• To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Numerical Methods – 1: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.	Classroom teaching ICT tools and Google classroom
Unit – II	Numerical Methods – 2: Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, GaussSeidal, and Relaxation method.	Classroom teaching ICT tools and Google classroom
Unit – III	Numerical Methods – 3: Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.	Classroom teaching ICT tools and Google classroom
Unit – IV	Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method.	Classroom teaching ICT tools and Google classroom
Unit - V	Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's,Continuous Distribution: Normal Distribution, Exponential Distribution.	Classroom teaching ICT tools and Google classroom

Course Outcomes:

The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of Transforms, Numerical Methods for Solving Ordinary Differential Equations of First Order & Concept of Probability.

Text Books:

- Higher Engineering Mathematics B.S. Grewal Khanna Publication
- Engineering Mathematics S S Sastri PHI
- Advance Engg. Mathematics Ramana TMH New Delhi

Reference Books:

- Engineering Mathematics Samnta Pal and Bhutia Oxford Publication
- Advanced Engineering Mathematics Erwin Kreyszig Wiley India
- Advanced Engineering MathematicsH C TanejaI.K. International Publishing House Pvt. Ltd.

Job Opportunity	Employability skill developed	Local/ National/ UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide formulate fundamental probability distribution and random variables.	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code: 3TBME- 302**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: MATERIALS TECHNOLOGY **Theory Min. Marks:17**

COURSE OBJECTIVE:

The course introduces several advanced concepts and topics in the rapidly evolving field of material science. Students are expected to develop comprehension of the subject and to gain scientific understanding regarding the choice and manipulation of materials for engineering applications.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Solidification of metals, Crystallisation, Crystal and amorphous, different types of bonds in different metals, Crystallography. Stability and meta stability of metals. Different mechanical properties of metals and other engineering materials like strength, hardness, elasticity, plasticity, Malleability, Ductility, Creep, Fatigue etc. Introduction to industrial metals, steels and prevailing manufacturing methods bymanufacturers.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Cooling curves, Isomorphous, Eutectic, Eutectoid , Eutectoid solid solution, Peritectic and other phase diagrams, Alloying , Characteristics of alloying elements, Iron – Carbon phase diagram, T-T-T diagrams, Types of Cast Iron. Types of Stainless Steels, Elastic, an elastic and Visco-elastic behaviour.	Classroom teaching ICT tools and Google classroom,
Unit – III	Heat treatment of metals, Based on phase diagram and T-T-T-Diagram the heat treatment of various metals, Bulk heat treatments, surface heat treatments, Case carburising, Types of Anealing, Normalising, Spherodising, Phase Transformations like Pearlite, Cementite, Austenite, Troostite,Bainite,Hard and soft Martensite etc. Laser hardening, Cyaniding, Boriding, Nitriding, Flame hardening, Ionimplantation, Etc. Heat treatment cycles. Metallographic studies, Optical Microscope, Electron Microscope.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Destructive and non-destructive testing methods, Tensile test, Compression test, shear test, bend test, Different types of Hardness tests, Impact tests, Fatigue tests, Hardenability test. Fracture analysis, NDT Methods. Different properties of Steels, Aluminium and it's alloys, Copper and it's alloys, Manganese and it's alloys, Chromium and it's alloys, Nickel and it's alloys.	Classroom teaching ICT tools and Google classroom,
Unit - V	Chemical Analysis of different alloying elements in commercial metals, C, Fe, Cr, Ni, Mn, Mg, S, P, Co, Mo, Etc. Different chemical reagents, Equipments , Volumetric and Gravimetric analysis, Spot test, Colorimetric methods, Optical and spectro photometric analysis.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- To acquire basic understanding of advanced materials, their functions and properties for technological applications.
- To emphasize the significance of materials selection in the design process
- To understand the principal classes of bio-materials and their functionalities in modern medical science

- To get familiarize with the new concepts of Nano Science and Technology
- To educate the students in the basics of instrumentation, measurement, data acquisition, interpretation and analysis

Text Books:

- Material science and Engineering Raghavan V PHI Publication
- Engineering materials and Metallurgy Sriniwasan R Mc Graw Hill Education
- Introduction to Engineering Materials Agarwal BK Mc Graw Hills

Reference Books:

- Material science Narula GK, KS and Gupta VK Mc Graw Hill Education
- Essentials of Material Science & Engineering Askeland CENGAGE Learning
- Callister's Material Science R Balasubramaniam Wiley Students edition

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Material science engineer. Material store supervisor	Will be able to develop new type of material. Will be able to identify micro-constituents in a material.	Goal08(Decent work and economic growth) Goal04(Quality education)	Can start own laboratory for material selection and material identifier

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code: 3TBME- 303**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: STRENGTH OF MATERIAL **Theory Min. Marks:17**

COURSE OBJECTIVE:

To familiarize the students with the fundamentals of deformation, stresses, strains machine elements. To teach students how to apply the concepts of stress analys theories of failure and material science to analyze, design and/or select common used machine components.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Stress and strain: stresses in members of a structure, axial loading, normal stress, shear stress, analysis of simple structures, stepped rods, members in series and parallel: stress strain diagram, Hooke's law, stress due to temperature, Poisson's ratio, Bulk modulus, shear strain, relation among elastic constants, residual stress, fiber reinforced composite materials, strain energy under axial loads and stresses due to impact of falling weights. Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analysis.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Bending: Pure bending, symmetric member, deformation and stress, bending of composite sections, eccentric axial loading, shear force and BM diagram, relationship among load, shear and BM, shear stresses in beams, strain energy in bending, deflection of beams, equation of elastic curve, Macaulay's method and Area moment method for deflection of beams.	Classroom teaching ICT tools and Google classroom,
Unit – III	Torsion in shafts: Torsional stresses in a shaft, deformation in circular shaft, angle of twist, stepped and hollow transmission shafts.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Theories of failures: Maximum normal stress & shear stress theory; maximum normal and shear strain energy theory; maximum distortion energy theory; application of theories to different materials and loading conditions.	Classroom teaching ICT tools and Google classroom,
Unit - V	Columns & struts: Stability of structures, Euler's formula for columns with different end conditions, Rankine's formula.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

At the completion of this course, students should be able to

- Know the concepts of stress and strain.
- Analyze the beam of different cross sections for shear force, bending moment, slope and deflection.
- Understand the concepts necessary to design the structural elements and pressure vessels.

List of experiments (PI. expand it):

1. Standard tensile test on MS and CI test specimen
2. Fatigue test
3. Brinell Hardness tests
4. Vicker hardness test
5. Izod/ Charpy impact test

Text Books:

- Strength of Materials Sadhu Singh Khanna Pub
- Strength of materials R Subramannian OXFORD University Press,Third Edition
- Strength of materials S Ramamurthum Dhanpat Rai
- Strength of materials Rattan Second Edition , Mc Graw Hills

Reference Books:

- Mechanics of Materials Beer FP, Johnson Sixth Edition ;Mc Graw Hills
- Strength of Materials Debabrata Nag & Abhijet Chanda Wiley
- Strength of Materials Nash William; Schaum's Outline Series Mc Graw Hills
- Mechanics of SolidsSingh Arbind K PHI

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Manager, supervisor, boiler operator, maintenance engineer	Able to identify use of thermal instruments and devices, use of heating devices	Goal08(Decent Work and Economical Growth) Goal07(affordable and clean energy)	Industries and manufacturing industries. Power Plant

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SEMESTER- 3rd **Subject Code: 3TBME-304**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: APPLIED THERMODYNAMICS **Theory Min. Marks:17**

COURSE OBJECTIVE:

To develop ability and gain insight into the process of problem-solving, with emphasis on thermodynamics .Specially in following manner:

- Apply conservation principles (mass and energy) to evaluate the performance of simple engineering systems and cycles.
- Evaluate thermodynamic properties of simple homogeneous substances,
- Analyze processes and cycles using the second law of thermodynamics to determine maximum efficiency and performance.
- Discuss the physical relevance of the numerical values for the solutions to specific engineering problems and the physical relevance of the problems in general, and Critically evaluate the validity of the numerical solutions for specific engineering problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Basic Concepts & Laws of Thermodynamics: Basic concepts: Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Avagadro's Hypothesis, Heat and work transfer. First law of thermodynamics- first law applied to various systems steady flow process, limitations of first law of thermodynamics.	Classroom teaching ICT tools and Google classroom,
Unit – II	Second law of thermodynamics: Heat engine, heat reservoir, Refrigerator, heat pump, Carnot's cycle, statements of second law Reversible and irreversible processes, consequence of second law, Clausious Inequality , Entropy, T-S diagrams, Available & Unavailable energy Availability Concept.	Classroom teaching ICT tools and Google classroom,
Unit – III	Properties of Steam : Pure Substance, Phase, Phase-transformations, formation of steam, properties of steam, PVT surface, HS,TS,PV,PH,TV diagram, processes of vapor measurement of dryness fraction, Use of steam tables and Mollier chart.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Air standard cycles: Carnot, Otto, Diesel, Dual cycles and their comparison, Brayton cycle, Two stroke and four stroke engines, Non reactive gas mixture, PVT relationship, mixture of ideal gases, properties of mixture of ideal gases, internal energy, Enthalpy and specific heat of gas mixtures. Deviation of ideal gas, Vander wall's equation, evaluation of its constants	Classroom teaching ICT tools and Google classroom,
Unit - V	Fuels & combustion: Actual & theoretical Combustion processes , Enthalpy of formation & enthalpy of reaction, first law analysis of reacting systems, Adiabatic flame temperature , Basic concept of Third Law of thermodynamics . Steam Tables, Mollier Charts & tablesconnected to reactive systems are allowed in Examination hall.	Classroom teaching, ICT Based and individual presentation and Google classroom,

List of Experiments:-

1. To Plot Specific Fuel Consumption Vs. r.p.m Diagrams for single cylinder four stroke Petrol Engine.
2. To Plot Specific Fuel Consumption Vs. r.p.m Diagrams for single cylinder four stroke Diesel engine.
3. To Plot Specific Fuel Consumption Vs. r.p.m Diagrams for four cylinders four stroke Diesel engine.
4. To study high pressure boilers and their accessories and mountings.
5. To study Working of Impulse & Reaction steam Turbine by Models.

COURSE OUTCOME:

At the completion of this course, students should be able to

- Find values of thermodynamic properties in tables;
- Draw thermodynamic processes on pressure-temperature, pressure- volume, or temperature volume diagrams;
- Use compressibility charts;
- Calculate expansion or compression work in a closed system;
- Use conservation of mass to determine the change in mass of a system

Text Books:

- Engineering Thermodynamics P.K.Nag Mc Graw Hills Fifth Edition
- Applied Thermodynamics R Yadav Central Publishing house Allahabad

Reference Books:

- Thermodynamics Cengel YMC Graw Hills ,Eight Edition
- Thermodynamics for EngineersKross & Potter CENGAGE Learning
- Boettner Principles of Engineering ThermodynamicsMoran, ShapiroWiley student edition
- Engineering Thermodynamics P Chattopadhya OXFORD University Press
- Heat & Thermodynamics ZemanskyMc Graw Hills India Education
- Engineering Thermodynamics Achuthan M PHI India.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Manager, supervisor, boiler operator, maintenance engineer	Able to identify use of thermal instruments and devices, use of heating devices	Goal08(Decent Work and Economical Growth) Goal07(affordable and clean energy)	Industries, and manufacturing industries.Power Plant

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code: 3TBME- 305**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: MANUFACTURING PROCESS **Theory Min. Marks:17**

COURSE OBJECTIVE:

To make the students aware of different manufacturing processes like casting, metal forming, metal cutting and gear manufacturing.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Casting : Types of casting process, Molding and Foundry core sands and their properties, gating, runners, risers, solidification, defects and elimination, molding machines, centrifugal casting, dye casting, shell molding; Lost wax molding; continuous casting; cupola description and operation	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Welding: Types of welding ,Gas welding method, flames, gas cutting, Electric arc welding, AC and DC welding machines and their characteristics, flux, electrodes, submerged arc welding, TIG & MIG welding; pressure welding; electric resistance welding spot, seam and butt welding; Thermit chemical welding; brazing and soldering, welding defects & remedies .safety precautions	Classroom teaching ICT tools and Google classroom,
Unit – III	Pattern Making: Types of patters, Pattern and pattern making, pattern allowances; pattern design considerations, core, core boxes . Forging: types of forging operations Theory and application of forging processes description, drop and horizontal forging machines .	Classroom teaching ICT tools and Google classroom,
Unit – IV	Press working: Description and operation of processes, process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing; press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters, forces, pressure and power requirements .	Classroom teaching ICT tools and Google classroom,
Unit - V	Rolling: Types of Rolling operations, General description of machines and process; rolling of structural section plates and sheets; hot and cold rolling techniques Metal Machining: Basics of Lathe machines , operations & components ,working principle of Shaper & planner, Introduction to milling, grinding and drilling machines.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Concepts of casting Technology.
- Mechanical working of metals.
- Concepts of welding process.
- Concept of forging methods.
- Understanding press working.

List of Experiments:

1. Study of tools used for various manufacturing processes , study includes application & live demonstration of hand and machine tools .
2. Hands on Exercise on Pattern Making
3. Performance on Metal Casting of Simple component
4. Performance on Welding of simple work piece (Example Arc and Resistance Welding)
5. Exercise Problems on Welding
6. Exercise problems on Casting
7 Study of forging machine & demonstration of various operations of forging.
8 Study of Hydraulic, Pneumatic presses & demonstration of piercing, slitting, deep drawing operations on press machine.

Text Books:

- Manufacturing ProcessesKaushish JPPHI Learning
- Producting Engineering Kalpakjian PEARSON Education

Reference Books:

- Workshop Technology ChapmanViva Books
- Workshop TechnologyRaghuvanshiDhanpat Rai
- Workshop TechnologyHajra ChoudharyMedia Promoters and Publishers Pvt. Ltd.
- Shop Theory Anderson and TetroMc Graw Hills
- Manufacturing Process & systemsPhilip F OstwaldJohn Wiley

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer in Manufacturing Industry. Production Management.	Able to cast material in various component, able to work on various machines	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Casting of component, Machining of component.

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code: 3TBME- 306**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: SOFTWARE LAB-IC++ **Theory Min. Marks:12**

COURSE OBJECTIVE:

The objective of this course is to understand the advantage of C++ programming. It helps to understand the key features of C++ Programming and Methodology.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Programming, Categories of Programming Languages ,Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming. Basics of C ,Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions	Classroom teaching ICT tools and Google classroom,
Unit – III	Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Relationships between classes, Association of objects, Types of Association, Recursive Association, Multiplicities, Navigability, Named association, Aggregation of objects. Types of Aggregation, Delegation, Modeling Association and Aggregation. Container Classes, Container types, typical functions and iterator methods, Heterogeneous containers	Classroom teaching ICT tools and Google classroom,
Unit - V	Persistent objects, stream, and files in c++ , Introduction to Data Structures in c++, Study of C++/Java as Object-oriented programming language.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

On the completion of this course students will be able to:

- Define data types but also deals with operations applied for data structures.
- Implement algorithms and complex problems

Text Books:

- Object oriented programming with C++",David Parsons BPB publication
- Object oriented programming in C++", Robert LaforeGalgotia
- Object oriented programming in C++", BalagurusamyTMH
- Object oriented technologyMahindra ku.,Shree Sai.

Reference Books:

- Java Complete ReferenceHerbert SchildtMc Graw Hill
- Programming in C++ (Schaum)"HubbardTMH
- Mastering C++", VenugopalTMH

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Testing engineer Design engineer	Able to provide speaking skills	Goal 04(Quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd
Course: BE Mechanical
SUBJECT: SKILL ELECTIVE-I
AUTOMOBILE MAINTENANCE

Subject Code: 3STME-307
Theory Max. Marks: 25
Theory Min. Marks: 12

COURSE OBJECTIVE:

On completion of this course, the students are expected to understand the various repair activities, fundamental principle, operation, performance of IC Engines and its auxiliary systems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	The Power Unit: Types of engines for two wheelers, advantages and disadvantages of two stroke and four stroke engines, engine components, constructional details, materials, symmetrical and unsymmetrical port timing diagrams, valve actuating mechanisms, valve timing diagrams. Rotary valve engine.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Fuel, Lubrication and cooling system: Layout of fuel supply system, fuel tank construction, carburetor types, construction, working and adjustments. Types of cooling systems, advantages of air cooling system, Lubrication types.	Classroom teaching ICT tools and Google classroom,
Unit – III	Transmission system: Primary drive and Clutch: Motor cycle power train, Primary drives, Types of primary drives, Chain drive, Gear drive, Construction and operation of motorcycle clutches, Clutch release mechanism. Gear boxes and Transmission: Introduction to motorcycle transmission, Sprockets and chain, Gears and Dogs in motor cycle transmission.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Frames and suspension: Types and constructional details of frames, advantages and limitations, frame materials, frame stresses, frame building problems, frame components, Front and Rear suspension systems, shock absorber construction and working.	Classroom teaching ICT tools and Google classroom,
Unit - V	Brakes and Wheels: Front and rear braking systems, disc and drum brakes, merits and demerits. Types of wheels, loads on wheels, construction and materials for wheels, wheels designation. Tyre designation, inflation, types of tyres, construction details.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

Acquire the knowledge of engine components and other systems like steering, brake, transmission, electrical etc.Understand the working and repair of engine auxiliary systems. Understand the various maintenance activities of four wheeler Understand the combustion aspects of CI Engines

Practical Part

General health & Safety precautions to be observed in the workshop / garage

- Over view on 5S technique (Sort, Set in order, Shine / Sweep, Standardize & Sustain)-advantages in implementation of 5S
- Working principle of 2 & 4 stroke engines
- Procedure for dismantling, clean
- ing & assembling of major assemblies of vehicle
- Functions &Types of lubrication & cooling systems
- Fuel system layouts (Petrol, diesel & CNG) Functions of carburettor and adjustments
- Ignition system circuit & components
- Brief introduction on battery and its maintenance
- Purpose & types of clutch, gear box & brakes
- General defects in clutch, Gearbox & brakes
- Tyre designation (size)

Practice Health & Safety – select, use, maintain & store – tools, equipments & clothing safely , Practice 5S technique

- Identify / Familiarize with the tools & equipments
- Identify components of 2 & 3 wheeler from assembly drawings & diagrams
- Water washing / cleaning of 2 & 3 wheelers
- Clean/replace air cleaner, fuel strainers and oil filters
- Drain & replenish lubricants
- Remove, clean, check, refit/replace – fuel tank, fuel pipes, fuel tap operation
- Clean, Check and Adjust spark plug
- Replace brake components, adjust brake & top-up brake fluid
- Adjust clutch play
- Adjust, remove links & lubricate drive chain
- Replace control cables – clutch, brake & accelerator cables – adjust clutch & brake plays
- Charge the battery
- Check pressure, inflate, measure tread depth, inspect for damage, do Wheel truing, Repair tyre puncture & Tuffe-up tube
- Check and replace bulbs

Text Books:

- Vehicle System Maintenance Gaffar G. Momin & Neeta Yawale Tech-Max Publication
- Automotive Engineering Kripal Singh Khanna Pub
- The Motor vehicle Newton & Steeds Society of Automotive Engineer

Reference Books:

- Basic Automobile Maintenance Caprio & Dennis Howard W Sams
- Internal Combustion Engines Gupta HN PHI
- Automotive Mechanics Joseph Heitner CBS Pub

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Defense officer, Manager,	Solving of salesman problems to maintain Time estimation in industries Developed statically skill	Goal12(Responsible Consumptions and Production technique)	Popular technical approach for analyzing and designing an application, system, or business

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 3rd **Subject Code:3STCE- 307**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: WATER HARVESTING & MANAGEMENT **Theory Min. Marks: 12**

COURSE OBJECTIVE:

The objectives of the rain water harvesting are:

(i) To meet the increasing demand of water.
(ii) To reduce run off.
(iii) To avoid flooding of roads.
(iv) To augment the groundwater storage and to raise the water table.
(v) To reduce groundwater pollution.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction of water harvesting, process of water Harvesting, process of collection, conveying & storing water from rainfall in an area–for beneficial use. Storage–in tanks reservoirs	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Basic Components of WH:–Precipitation–Collection of water from surface catchment, water storage, Distribution of water	Classroom teaching ICT tools and Google classroom,
Unit – III	Technology used for collecting & storing rainwater from rooftops, watersheds using various techniques such as tanks or check dams or recharge to aquifer. Flood water diversion	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Harvesting Techniques: Micro-catchments techniques; Contour bunds, eyebrow terrace, hill-slope micro-catchments, negarim, contour ridges etc. Macro- catchments techniques; hillside conduit, stone dams, liman terraces, cultivated reservoirs, farm ponds shallow wells	Classroom teaching ICT tools and Google classroom,
Unit - V	Storage: Underground and above-ground storage. groundwater availability necessity temporal & spatial variation of rainfall & water availability, groundwater recharge, natural recharge, artificial recharge & its techniques, advantages of water harvesting	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME

- Discuss basic concepts of "Rain Water Harvesting"
- Estimate the surface runoff from given precipitation data.
- Describe various types of survey investigations for reservoir planning
- Design the appropriate rain water harvesting scheme and required structures for given conditions.

Practicals:

1 Type of water harvesting structures
2 Case study of any water harvesting system

3 Field study trips to various locations and collecting technical data. 4 To make a contour plan of given area
5 To determine the coefficient of discharge of broad crested weir and to plot water surface profile over weir
6 To determine the local point pressure with the help of pitot tube
7 Determination of water looses.

Text Books:

- Water Management Patel and Shah (2008), New Age international Publications
- Watershed Management J.V.S Murthy New Age international Publications

Reference Books:

- Rainwater Harvesting for Dryland and Beyond Rainwater Harvesting for Dryland and Beyond Volume 1, 2, and 3 Lancaster, B. Rain source Press, Arizona

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide technical drawing skills	Goal 04(Quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBBE 401**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: ENERGY & ENVIRONMENTAL ENGG. **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objective of this Course is to provide an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Energy Science: Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Ecosystems Concept of an ecosystem: Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	Classroom teaching ICT tools and Google classroom,
Unit – III	Biodiversity and its conservation Introduction: Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Exsitu conservation of biodiversity.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Environmental Pollution Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	Social Issues and the Environment From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of	Classroom teaching ICT tools and Google classroom,

	people; its problems and concerns. Case Studies Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.	

COURSE OUTCOME:

On completion of this course, students will be able to

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Critically analyze technical subject matter (written or oral) for scientific merit apply learned environmental knowledge and understanding to solve technical/research problems in new contexts

Text Books:

- Environmental Studies R. Rajagopalan Oxford IBH Pub
- Energy, Environment, Ecology and Society Kogent Learning Solutions Inc Dreamtech

Reference Books:

- Introduction to sustainable engineering Ramesh, Lekshmi Dinachandran Rag, R. L

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
	Able to provide technical drawing skills	Goal 04(Quality education)	

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBME 402**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: INSTRUMENTATION & CONTROL **Theory Min. Marks:17**

COURSE OBJECTIVE:

- Develop ability to set up measurement systems with a control environment
- Develop an ability to design and utilize advanced control systems.
- To Estimate errors and uncertainty in measurements using statisticalanalysis.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to instrument systems, classifications, functional elements of a measurement system, standards and calibration, static performance characteristics, measurement errors and uncertainties, analysis, sequential and random test, specifications of instrument static characteristics, data acquisition, reduction, data outliner detection.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Dynamic characteristics of the instruments, formulation of system equations, dynamic response, compensation, periodic input, harmonic signal non harmonic signal, Fourier transform, response to the transient input, response to random signal input, first and second order system compensation.	Classroom teaching ICT tools and Google classroom,
Unit – III	(a) Temperature measurements, thermometry based on thermal expansion, liquid in glass, bimetallic, electric resistance- thermometry, thermocouples, thermistors, detectors, (b) pressure and velocity measurements, barometer, manometer, dead weight tester, pressure gauges and transducers, dynamic measurements,(c) flow measurements, pressure differential meters, orifice meter, venturi meter, rota-meter.	Classroom teaching ICT tools and Google classroom,
Unit – IV	strain gauges, strain and stress measurements, electrical circuits, compensations, motion force and torque measurements, displacement measurements, potentiometers, linear and rotary variable differential transformers, velocity measurements, electromagnetic technique, stroboscope, load cell, measurement of torque on rotating shaft, power estimation from rotating shaft	Classroom teaching ICT tools and Google classroom,
Unit - V	Control systems, open loop and close loop control, mathematical modeling of dynamic systems – mechanical systems, electrical systems, fluid systems, thermal systems, transfer function, impulse response function, block diagrams of close loopsystems, system modeling using software	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

At the completion of this course, students should be able to:

- Be competent in performing mechanical measurements using various sensors and transducers.
- Understand working principles in the measurement of field quantities
- Understand the conceptual development of zero, first and second order systems.

List of Experiment (Expandable):

1. Study of various temperature measuring devices; thermo couple, RTD, gas thermo meters.
2. Measuring velocity of fluid flow by Venturi meter/ orifice meter/ pitot-tube.
3. Measuring torque and power generated by a prime mover by using pony brake dynamometer.
4. Study of various pressure measuring devices like manometers, mercury in glass pressure gauge.
5. To develop a measuring device for fluid level measurement.

Text Books:

- Instrumentation measurement and analysis Nakra B.C.Chaudhary K.K Tata McGraw Hill, ISBN 0 07 451791 0
- Mechanical Measurements and Control Dr. D.S. Kumar Metropolitan book Pvt Ltd.
- Mechanical Measurement and Instrumentation Er. R. K. Rajput Katson Publication

Reference Books:

- Theory and design of mechanical measurements. Richard S, Figiola & Donal E. Beasley, John Wiley Wiley
- A course in Mechanical Measurement and Control A. K. Sawhney Danpat Rai and Sons

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer, supervisor Manager	Will be able to understand the working of electronic instruments used in industry, labs and various service stations	Goal04(Quality education) Goal08(Decent work and economic growth)	Can start own laboratory for material testing.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBME 403**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: THEORY OF MACHINES **Theory Min. Marks:17**

COURSE OBJECTIVE:

To expose the students to learn the fundamentals of various laws governing rigid Bodies and its motions also expose the various motion of the machine elements.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Mechanisms and Machines: Link, Pairs, Chain, Structure, Mechanism, machine, equivalent linkages, degrees of freedom, Grubler's criterion, kinematic inversions of four bar mechanism and slider crank mechanism, Mechanism with lower pairs pantograph, straight line motion mechanisms, Davis and Ackermann's steering mechanisms, Hooke's joint.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Motion: Plane motion , absolute and relative motion, Displacement, Velocity and acceleration of a point, velocity and acceleration analysis by Graphical & Analytical methods, Velocity image, Velocity of rubbing, , Kennedy's theorem, Acceleration Image, Acceleration image, Acceleration polygon, Coriolis component of acceleration, Klein's construction, velocity and acceleration analysis using Complex Algebra(Raven's Approach).	Classroom teaching ICT tools and Google classroom,
Unit – III	Gears: Classification of gears, Helical, Spiral, Bevel, Worm and Spur Gear, Spur gear terminology. Law of gearing, tooth profile, velocity of sliding, arc of contact, path of contact, contact ratio, interference and undercutting, Conjugate action.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Gear trains: Simple, compound, reverted and epi cyclic gear trains. Velocity ratio and torque calculation in gear trains. Cams: Classification of followers and cams, radial cam nomenclature, analysis of follower motion (uniform, modified uniform, simple harmonic, parabolic, cycloidal) pressure angle, radius of curvature, cam profile for radial and offset followers, synthesis of cam profile by graphical approach, cams with specified contours.	Classroom teaching ICT tools and Google classroom,
Unit - V	Gyroscopic Action in Machines: gyroscopic effect on naval ships; stability of two and four wheel vehicles, rigid disc at an angle fixed to a rotating shaft. Angular velocity and acceleration, gyroscopic torque/ couple	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

At the completion of this course, students should be able to know

- Basic mechanisms, velocity and acceleration of simple mechanisms
- Drawing the profile of cams and its analysis
- Gear train calculations, Gyroscopes
- Inertia force analysis and flywheels
- Balancing of rotating and reciprocating masses

List of experiments (expandable)

1. To study all inversions of four-bar mechanisms using models
2. Determination of velocity and acceleration in above using method of graphical differentiation
3. To study working of differential gear mechanism.
4. To plot fall and rise of the follower versus angular displacement of cam and vice versa.
5. Study of universal gyroscope
6. To find out the velocity ratio of various gear trains.
7. To study the various types of belt drive & find out the velocity ratio of the drive.
8. To draw the cam profile.

Text Books:

- Theory of machines; Rattan SS MC Graw Hills
- Theory of machines; R.S Khurmi S.Chand
- Mechanism and Machine Theory Ambekar AG PHI. Eastern Economy Edition

Reference Books:

- Theory of Machines Dr.Jagdish Lal Metropolitan Book Co; Delhi
- Theory of machines & Mechanism Uicker & Shigley Oxford University Press
- Mechanism and Machine Theory Rao J S and Dukkipati New Age Delhi
- Theory of Machines Abdulla Shariff
- Theory of Machines Thomas Bevan Pearson Education

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Design engineer, Manager	Able to understand the application of kinematics in any kind of machinery.	Goal(Decent work and economic growth) Goal04(Quality education)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBME 404**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: FLUID MACHINES-I **Theory Min. Marks:17**

COURSE OBJECTIVE:

To be familiar with all the basic concepts of fluids and fluid flow phenomenon, conservation equations and their applications to fluid flow problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Fluid Static's : Review of Basic concepts &properties of the fluid . Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces ; buoyant force, Stability of floating and submerged bodies, Relative equilibrium.	Classroom teaching ICT tools and Google classroom,
Unit – II	Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow net & its applications , method of drawing flow nets	Classroom teaching ICT tools and Google classroom,
Unit – III	Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi- meter, weirs and notches)	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Dimensional Analysis : Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers Introduction to boundary layer, Boundary layer development on a flat plate and its characteristics - Boundary layer thickness, displacement thickness, momentum thickness, energy thickness. Momentum equation for boundary layer by Von karman, drag on flat plate, boundary layer separation and its control. Aerofoil theory, lift and drag coefficients, streamlined and bluff bodies	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	Flow through Pipes : Reynolds experiment & Reynolds number, laminar & turbulent flow, Introduction to Navier Stokes' Equation, relation between shear & pressure gradient, laminar flow through circular pipes, friction factor, laminar flow between parallel plates, hydrodynamic lubrication.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

At the completion of this course, students should be able to

- Understand the properties of the fluid.

- Understand and solve the fluid flow problems.
- Understand the mathematical techniques of practical flow problems.
- Understand the energy exchange process in fluid machines.

List of experiments :

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of Cc, Cv, Cd of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. To study the characteristics of a centrifugal pump.
10. Verification of Impulse momentum principle.

Text Books:

- Fluid Mechanics & hydraulic Machines R.K. Bansal Mc Graw Hills
- Fluid Mechanics R Mohanty PHI
- Fluid Mechanics K L Kumar PHI
- Fluid Mechanics & hydraulic Machines Modi & Seth Laxmi publication

Reference Books:

- Fluid Mechanics Streeter VL, Wylie EB, Bedford KW Mc Graw Hills
- Fluid Mechanics2FOX , McDonald Pritchard Wiley students edition
- Fluid MechanicsWhiteMc Graw Hills
- Fluid MechanicsCengalMc Graw Hills
- Fluid MechanicsCS JogVolume II CAMBRIDGE IIScSeries

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
sales officer, Manager,	Creative designing for different parts of automobile, problem solving for failure and fault.	Goal-08(Decent Work and Economical Growth)	Show rooms, industries, garage shop and manufacturing industries. power plant

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBME 405**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: MACHINE DRAWING & CAD **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To enable the students to prepare a detailed assembly drawing for machine components.
- Provide the fundamental concepts of machine drawing elaborating on how to concretize the idea of new structure such as a machine element
- The objective of the AutoCAD Fundamentals Course is to enable students to create a basic 2D & 3D drawing in the AutoCAD software

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Drawing conventions: IS codes, sectional views and sectioning, surface finish and tolerances representation of machine parts such as external and internal threads, slotted heads, square ends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs, gears, Rivet heads and Riveted joints, Welded joints, Drawing of Threaded fasteners.	Classroom teaching ICT tools and Google classroom,
Unit – II	Assembly Drawing: Assembly Machine Drawing ,Basic concept of assembly drawing ,bill of materials, Assembly drawing of Cotter and Knuckle joints, pedestal and footstep bearings, Engine parts- crosshead and stuffing box, IC engines parts - piston and connecting rods; lathe machine parts-Tool post and Tail Stock.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – III	CAD: Introduction to Compute Aided Drafting software for 2D and 3D Modeling, Basic design concepts, design process. Software and hardware required to produce CAD drawings Software: operating systems; CAD software packages e g AutoCAD, AutoCAD/Inventor, Micro station, Catia, Pro/ENGINEER, Solid works; minimum system requirements.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Preparing & interpreting CAD drawing, orthographic projections; Commands: absolute/relative/polar coordinates; features eg. line types, grids, snaps, circle, text, hatching, dimensioning, layers/levels, colour; viewing e g zoom, pan; inserting other drawings e g symbols, blocks; modifying e g copy, rotate, move, erase, scale, chamfer, fillet Interpret: determine properties of drawn objects e g list, distance, area, volume use CAD software to produce 2D & 3D assembly drawings and views	Classroom teaching ICT tools and Google classroom,
Unit - V	3D environment: 3D views e g top, front, side, isometric 3D models: 3D techniques e g addition and subtraction of material, extrude, revolve, sweep, 3D coordinate entry (x, y, z), wireframe drawing, 2D to 3D (thickness, extrusion); surface models; solid.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understand Indian standards for machine drawing.

- Understand Fits and Tolerances in technical drawing.
- Prepare assembly drawing of joints, couplings and machine elements.
- Design and prepare Jigs and fixtures for given components

Text Books:

- Machine Drawing Bhatt, ND Charotar Publication
- Machine DrawingK C JohnPHI
- Machine designR.S. KhurmiS. Chand

Reference Books:

- Machine Drawing Singh A TMH publication
- Machine DrawingNarayana and Reddy New age, Delhi.
- Mechanical Engineering Design Shigley JE et al TMH

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer in Automobile Industry. Design Engineer in Manufacturing Industry. Product Management.	--Able to design the simple machine parts and elements. --Able to choose the suitable material for a product.	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	--Can design his own product and sell it to the market. --Can give the services for the specific industry related to design of machines.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 4th **Subject Code: 3TBME 406**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Software Lab-II AUTO-CAD **Theory Min. Marks:12**

COURSE OBJECTIVE:

- Learn to sketch and take field dimensions.
- Learn to take data and transform it into graphic drawings.
- Learn to draw simple components by using Auto Cad.
- Learn basic engineering drawing formats

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Role of computers in design and manufacture. Drawing soft ware, configuration, function and facilities, parametric representation, examples of drawings and systems.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Surface modeling, curves and surface representation – composite surfaces, case studies in CAD, parametric representation analytic and synthetic curves, surface manipulation, design and engineering applications.	Classroom teaching ICT tools and Google classroom,
Unit – III	Current developments in CAD, feature based modeling,, design by feature.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Solid modeling, boundary representation, analytic solid modeling, constructive solid geometry, sweep representation, design and engineering applications.	Classroom teaching ICT tools and Google classroom,
Unit - V	Strategic plan of CAD system design and development, graphic exchange, features recovery.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Student's ability to use architectural and engineering scales will increase.
- Students ability to produce engineered drawings will improve
- Student's ability to convert sketches to engineered drawings will increase.
- Students will become familiar with office practice and standards.
- Students will become familiar with Auto Cad two dimensional drawings.
- Students will develop good communication skills and team work.

Text Books:

- Learn Auto Cad in easy way Sunil K. Pandey Unitechbooks
- Beginning Auto Cad Cheryl R. Shrock BPB Publication

Reference Books:

- Auto Cad expert Reynaldo & Tagore Autodesk
- Auto cad 2017George Omura SYBEX

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design officer, Manager, Production engineer	Creative designing for different parts of automobile, problem solving for failure and fault.	Goal08(Decent Work and Economical Growth)	Show rooms, industries, garage shop and manufacturing industries.power plant

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SEMESTER- 4th **Subject Code: 3STME 407**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: SKILL ELECTIVE-II **Theory Min. Marks: 12**
BASIC REFRIGERATION AND AIR-CONDITIONING MAINTENANCE

COURSE OBJECTIVE:

To repair and service in refrigerator, water cooler, bottle cooler, deep freezer, Cooler, Walk in Cooler, Ice candy plant, Cold storage, Ice plant, Split Air Conditioner, Package Air Conditioner, Central Air Conditioner

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Importance of safety General precaution, General refrigeration & Air Conditioning Tools & Equipments used Heat , Temperature, Pressure, Unit of heat, temperature & Pressure, Use of pressure gauge, thermometer	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Refrigeration System Compressor, Condenser, Evaporator, Expansion Devise, Different types of all components as stated above	Classroom teaching ICT tools and Google classroom,
Unit – III	Basic Electricity Current, Potential difference, Resistance & its unit. Series Circuit & Parallel Circuit. Use of Voltmeter, ammeter, Multi meter. Different types of Electric motor used. Importance of safety General precaution, General refrigeration & Air Conditioning, Tools & Equipments used Refrigeration cycle Various factors in a Refrigeration cycle, unit of Refrigeration, Gas transforms from one state to another in a refrigeration cycle, De frosting system Handling of Gases & Gauges Pressure Gauge , Compound Gauge, Handling of different gases in workshop	Classroom teaching ICT tools and Google classroom,
Unit – IV	Identification of components used in Air conditioning Electrical components used in Window Ac unit, Electrical Components used in Split Ac unit, Electrical components used in Remote window AC, Electrical Components used in Remote split Ac, Type of Fan/ Blower Motors used in Window & split ac units Knowledge about checking & Measuring resistance, Current, Potential difference, using instruments such as Multi meter, Clamp Meter, Ampere meter, Volt meter. The units of current, potential difference, resistance Different Electrical & electronic components used in Refrigerator & deep freezer such as Relay, overload protector, thermostat etc.	Classroom teaching ICT tools and Google classroom,
Unit - V	Different Wiring circuits General Electrical wiring, Refrigerator wiring, Deep freezer wiring Good Service procedure using CFC & Non CFC Refrigerants Recovery of Gases, Various Good service Procedure used in RAC Different Wiring circuits in Ac unitsGeneral Electrical wiring, Window type air conditioner, Split type air conditioner, Remote window Ac wiring, Remote Split Ac wiring	Classroom teaching ICT tools and Google classroom,

Practical part

Familiarization of Safety Procedures, Identify tools & equipments, Care and Maintenance Identify different type of:

- Compressor (open type, Semi sealed, Sealed)
- Condenser (air cooled/ Water cooled)
- Evaporator
- Expansion device
- Use of thermometer
- Gauges (Compound & Pressure)

Use of measuring instruments such as

- Volt meter
- Ammeter
- Ohmmeter
- Multi meter
- Series and Parallel Connection

Test of open & Short Circuit

- Identify of various electric motors

Service & installation of Refrigerator & Air Conditioner, Bottle Cooler, Water Cooler Familiarization of Safety Procedures, Identify of tools & equipments Cut, Flare, Swag, Braze

- Prepare joints before brazing
- Flare & Swag copper pipes
- Braze

Practice measuring, Voltage, Current, Resistance

- Measure current, Potential difference, Resistance
- Check series of the compressor with the help of test lamp and Multi meter

Check resistance, Diode, Relay, thermostat, OLP etc.

- Refrigerator & deep freezer wiring practices
- Refrigeration wiring
- Deep freezer wiring

Service of Refrigerator & deep freezer

- Replacement of Components
- Flush, Vaccumise & Gas Charging Performance testing

Trouble Shooting & Performance of Refrigerator & Deep freezer

- Fault finding in refrigerator
- Fault finding in Deep freezer.

Test electrical components used in Air Conditioner

- Relay testing, Thermostat, timer, starting capacitor, running capacitor, over load protector, Fan capacitor, Fan / blower motor.
- Checking up of Compressor winding

List of Tools & equipment by which experiments are to be conducted

- Screw driver
- Line tester
- Files
- Hammer
- Drilling Machine
- Pliers,
- Crimping Tool
- Solder Iron
- Ampere meter
- Volt meter
- Megger
- Multi meter
- Dry bulb & wet bulb thermometer
- Tube cutter
- Hacksaw
- Pipe Wrench
- Torque Wrench

- Screw Wrench
- Vice
- Snip
- DE Spanner Set
- Ring Spanner Set
- Swaging tool
- Oxy Acetylene gas cylinder/Oxygen-LPG gas cylinder
- Blow torch
- Compressor
- E& C Unit
- Recovery Machine
- Gas Mani fold
- Compound Gauges,
- Pressure Gauge
- 32)Empty Cylinder for Refrigerant
- Nitrogen Cylinder with two stage regulator
- Halide Torch,
- Flaring tool set
- Compressor Condenser
- Evaporator
- Expansion device/capillary
- Different types of Electric Motors

COURSE OUTCOME:

- Acquire the knowledge of various Refrigeration and Air-conditioning systems like evaporator,
- Condenser, Expansion Valve, compressor etc.
- Able to diagnose and repair the faults in the Refrigeration systems.
- Understand the various maintenance activities of Air-Conditioning systems.
- Understand the Performance aspects of Refrigerator and Air-conditioner.

Text Books:

- Basic Refrigeration and Air Conditioning Anantha narayanan Mc Graw Hills
- Air Conditioning C. P. Arora Mc Graw Hills

Reference Books:

- Refrigeration and Air Conditioning G.F. Hundy, A.R. Trott and T.C. Welch Butterworth and Heinemann publication
- Refrigeration and Air Conditioning C.P. Arora , S. C. Arora , S. DomkundwarMc Graw Hills

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Maitance engineer of Refrigeration and air conditioning, Design engineer for air conditioning system	Able to maintain and design various refrigeration and air conditioning system	Goal04(Quality education) Goal08(Decent work and economic growth).	Refrigeration and air conditioning system maintenance and design

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SEMESTER- 4th **Subject Code: 3STEX-407**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Skill Elective-I ELECTRICAL HOUSE WIRING **Theory Min. Marks: 12**

COURSE OBJECTIVE:

Upon successful completion of the Residential Wiring/HTIprogram the student should be able to:

- Demonstrate proper safety practices and procedures.
- Understand the proper function of tools and testing equipment.
- Rough in and wire residential rooms following the National Electrical Code.
- Install, trouble-shoot and service Home Technology Integration Equipment

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Identification and use different types of tools like • Basic tools: Combination pliers, screw driver set, line tester, nose pliers, ball pane,cross pin, sledge hammers, electric knife, etc. • Measuring tools: Measuring tape, analog meters, digital meters, wire gauge, trisquare,etc., • Cutting & chasing tools: Hand saw, tennon saw, knife, chisels, drilling tools, etc. • Power tools: Drilling machine, chasing machine, cutting machine, demolition machine, etc. Testing tools: Test lamp, digital multimeter, clamp meter, line tester 500v, test lamp,etc.	Classroom teaching ICT tools and Google classroom,
Unit – II	Symbols :- symbols of different type of electrical element and equipment and machinery asSafety element :-fuse , MCB , RCD & earthing • Explain the safety precautions • Know precautions to be taken to prevent electric shock. • Explain causes of electric shocks, effects and shock treatment. Demonstrate Cardio-Pulmonary Resuscitation (CPR)	Classroom teaching ICT tools and Google classroom,
Unit – III	Wiring system – Types, testing, earthing, distribution etc Conductors and Insulators – • Define a conductor and an insulator • Differentiate between a conductor and an insulator • State the materials used for a conductor and an insulator • Understand the properties of a conductor and an insulator and their uses	Classroom teaching ICT tools and Google classroom,
Unit – IV	Series and Parallel circuit • Introduction with an electric circuit • Understand various types of circuits • Compare Series and Parallel connections • Draw a circuit diagram and solve simple calculations	Classroom teaching ICT tools and Google classroom,
Unit - V	Voltage, Current,Power • Introduction of work, power and energy and their units. • Distinguish between work, power and energy. • Calculate the power and energy consumption. • Calculation of Power of home.	Classroom teaching ICT tools and Google classroom,

Study of multimeter:- introduction of multimeter & use of multimeter

List of Experiment's

S.no	Experiments
1	Connecting a switch with socket
2	Connection of a switch with bulb
3	Two bulb control by a switch
4	Series connection
5	Parallel connection
6	One bulb and socket control by a switch
7	Two light control by two switch
8	Connection of ceiling rose
9	fixing of tube light
10	Finding fault in tube light
11	Replacing wiring of tube light
12	ceiling fan controlled by switch
13	Fan control by regulator through switch
14	Two way switching
15	Corridor lighting
16	Making electric board
17	Finding fault in board
18	Use of multimeter
19	1BHK wiring
20	2 BHK wiring

COURSE OUTCOME:

These courses aim to provide trainees with knowledge and skills in electrical wiring installation. They will be trained to install metal conduit and trunking, Installation of PVC trunking complete with correct size, wirings, terminating at light fittings, switches, terminal block. They will also be taught to practice good electrical wiring installation habits and worksite safety relating to electrical activities.

Text Books:

- Electrical House Wring Salim Aktar Siddiqui & A.K. Jain Ravi Publication
- Electrical Design :Estimation And Costing K B Raina & S K. Bhattacharya New Age Publication

Reference Books:

- Basic Electrical and house wiring Servicing Manohar Lotia & Rupal Lotia BNB Publication

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 5th **Subject Code: 3TBME 501**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: MANUFACTURING TECHNOLOGY **Theory Min. Marks:17**

COURSE OBJECTIVE:

- The course provides students with fundamental knowledge and principles in material removal processes.
- In this course, the students apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, and drill presses, Computer Numerical Control etc.
- To demonstrate the fundamentals of machining processes and machine tools.
- To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
- To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Analysis of Machining processes, introduction, tool geometry, tool materials, wear characteristics, cutting forces, , cutting fluids, failure of cutting tools, broaching operation, types of broaching machines, design of broaching tools, centre less grinding, thread chaser, thread grinding boring, super finishing processes like honing, lapping, electro polishing and buffing	Classroom teaching ICT tools and Google classroom,
Unit – II	Gear machining, types of gears, elements of gears, different methods of gear production, gear cutting on milling machine, gear machining by generation method, principles of generation of surfaces – hobbing, shaping and basic rack cutting, gear finishing by shaving and gear grinding, tooth profile grinding, suitable gear treatments	Classroom teaching ICT tools and Google classroom,
Unit – III	Plastics, composition of plastic materials, moulding method- injection moulding, compression moulding, transfer moulding, extrusion moulding, calendaring, blow moulding, laminating and reinforcing, welding of plastics.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Unconventional machining processes, introduction, abrasive jet machining, ultrasonic machining, electrochemical machining, electro discharge machining, electron beam machining, laser beam machining, plasma arc machining, non destructive testing of machined surfaces and tools.	Classroom teaching ICT tools and Google classroom,
Unit – V	Extrusion, principles, hot and cold extrusion processes, tube extrusion, sawing, power hacksaw, band saw, circular saw, Introduction to numerical control machining, NC Machine tools, NC-Tooling ,part programming, functions, coordinate systems	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understand ASA and ORS systems of tool geometry and their inter-relations.
- Develop relations for chip reduction coefficient, shear angle, shear strain, forces, power, specific energy and temperature in orthogonal cutting.
- Select cutting fluids, tool materials and coatings to control tool wear and temperature.

- Evaluate cutting speed to minimize production cost and maximize production rate.
- Understand the working principles, applications and importance of modern machining processes.

Books:

- Manufacturing Processes Kaushish JP PHI Learning.
- Producting Engineering Kalpakjian EARSON Education
- Workshop TechnologyChapmanLaxmi publication
- Workshop TechnologyRaghuvanshiDhanpat Rai

Reference Books:

- Shop Theory Anderson and Tetro Mc Graw Hills
- Manufacturing Process & systems Philip F Ostwald John Wiley
- Workshop Technology Hajra ChoudharyVol I

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Industrial engineer Manager,	Able to understand the various manufacturing process, able to apply the concept of manufacturing science	Goal08(Decent work and economic growth) Goal04(quality education) Goal12(responsible consumption and production)	Can start own manufacturing units or a workshop, Service Consultancy

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SEMESTER- 5th **Subject Code: 3TBME 502**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: FLUID MECHANICS-II **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To understand boundary layer theory
- To formulate basic equations for impact of free jets
- To understand construction and working and performance of various Turbines
- To understand construction and working & performance of various Pumps
- To solve and analyze a variety of fluid mechanics and fluid machinery related problems

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Boundary Layer Theory Boundary layer definition and characteristics, momentum equation, Laminar and turbulent boundary Layer, Total drag, separation and control. Flow around submerge bodies Force exerted by flowing fluid on a body: Drag and lift; stream lined and bluff body, Drag on sphere and cylinder, circulation and lift on circular cylinder, lift of an air foil.	Classroom teaching ICT tools and Google classroom,
Unit – II	Impact of Free Jets Impulse momentum principle, force exerted by the jet on stationary flat and curved plate, hinged plate, moving plate and moving curve vanes, jet propulsion of ship. Impulse Turbine Classification of turbine, impulse turbine, Pelton wheel, Construction working, work done, head efficiency and Design aspects, Governing of impulse turbine.	Classroom teaching ICT tools and Google classroom,
Unit – III	Reaction Turbine Radial flow reaction turbine, Francis turbine: construction, working, workdone, efficiency, design aspect, advantages & disadvantages over pelton wheel. Axial flow reaction turbine Propeller and Kaplan turbine, bulb or tubular turbine, draft tube, specific speed, unit quantities, cavitation, degree of reaction, performance characteristics, surge tanks, governing of reaction turbine	Classroom teaching ICT tools and Google classroom,
Unit – IV	Centrifugal Pumps Classification of Pumps, Centrifugal pump, Construction, working, workdone, heads, efficiencies, multistage centrifugal pump, pump in series and parallel, specific speed, characteristic, net positive suction head, cavitation.	Classroom teaching ICT tools and Google classroom,
Unit – V	Reciprocating Pumps Classification, component and working, single acting and double acting, discharge, workdone and power required, coefficient of discharge, indicator diagram, airvessels. Fluid system Hydraulic accumulator, Hydraulic intensifier, Hydraulic Press, hydraulic crane, hydraulic lift, hydraulic Ram, hydraulic coupling, hydraulic torque converter, air lift pump, jet pump.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Apply knowledge of fluid mechanics and fluid machinery for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of fluid mechanics and fluid machinery in the design and development of mechanical systems.
- Identify, analyze and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skilfully use modern engineering tools and techniques for mechanical engineering design, analysis and application

List of Experiments:-

1. To Find the Overall Efficiency of Centrifugal Pump Test Rig
2. To Conduct a Test on Francis Turbine Test Rig
3. To Conduct a Test on Pelton Wheel Turbine at Constant Head
4. Performance Test on Gear (Oil) Pump Test Rig
5. Cavitation Test Rig
6. To Determine the Coefficient of Impact of Jet
7. To determine Efficiency of Kaplan Turbine Test Rig

Text Books:

- Turbo machinery Venkanna BK PHI
- Turbo machinery Kadambi V Manohar Prasad Wiley Eastern Delhi
- Fluid Mechanics & hydraulic Machines R.K. Bansal Mc Graw Hills
- Fluid Mechanics R Mohanty PHI

Reference Books:

- Fluid Mechanics K L Kumar PHI
- Fluid Mechanics & hydraulic Machines Modi & Seth Laxmi publication
- Multi Gas Turbine Theory Rogers Cohen & Sarvan Pearson
- Steam Turbine Kearton W. J Pearson
- Turbo machinery Shepherd DG Collier MacMillan ltd

Job Opportunity	Employability skill developed	Local/ National/ UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Automobile engineer Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 5th **Subject Code: 3TBME 503**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: INTERNAL COMBUSTION ENGINE **Theory Min. Marks;17**

COURSE OBJECTIVE:

On completion of this course, the students are expected to understand the fundamental principle, operation, performance of IC Engines, auxiliary systems, combustion of SI & CI engines, various fuels used and engine emissions.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Internal Combustion Engine: S.I. and C.I. engines of two and four stroke cycles, real cycle analysis of SI and CI engines, determination of engine dimensions, speed, fuel consumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency, heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firing order, power balance for multi-cylinder engines.	Classroom teaching ICT tools and Google classroom,
Unit – II	Combustion in SI engines: Flame development and propagation ,Pressure-Crank Angle diagram , Stages of Combustion ignition lag, effect of air density, temperature, engine speed, turbulence and ignition timings, physical and chemical aspects , abnormal Combustion , effect of engine and fuel variables on abnormal combustion , pre-ignition, its causes and remedy, salient features of various type combustion chambers.	Classroom teaching ICT tools and Google classroom,
Unit – III	Combustion in C.I. Engines: Times base indicator diagrams and their study, various stages of combustion, delay period, diesel knock, knock inhibitors, salient features of various types of combustion chambers.	Classroom teaching ICT tools and Google classroom,
Unit – IV	I.C. Engine System: Fuels, ignition systems, cooling, exhaust/scavenging and lubrication system. Fuel metering in SI engine: Fuel injection in SI engine (MPFI, TBI,CRDI), Theory of carburetion, Solex Carburetor, simple problems on carburetion. Fuel metering in CI engines: Fuel injection in CI engine ,Working Principle of fuel pump & fuel injectors , types of nozzles , simple numerical problems . Cooling & lubrication of SI & CI Engines	Classroom teaching ICT tools and Google classroom,
Unit - V	Supercharging & Turbo charging : Methods of supercharging,& turbo charging Effects of super charging and turbo charging . Engine Modifications for supercharging, supercharging of two stroke engines. micro processor controlled supercharging .	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

Acquire the knowledge of engine components and fuel air cycles.

- Understand the working of engine auxiliary systems.
- Understand the combustion aspects of SI Engines
- Understand the combustion aspects of CI Engines.

List of experiments :

1. Determination of Valve timing diagram
2. Load test on Petrol Engine
3. Heat Balance of SI engine
4. Heat Balance of CI Engine
5. Study of Battery Ignition system and Electronic Ignition System
6. Study of Diesel fuel pump
7. Study of Diesel fuel injectors
8. Study of a Carburetors
9. Study of Fuel Injection system in SI Engine
10. Study of lubricating system in CI Engine

Text Books:

- Internal Combusion engines Ganeshan VTMH
- Internal Combustion Engines R Yadav TMH
- A. Course in IC engines Mathur M L & Sharma RP DhanpatRai
- ; Internal Combustion Engines DomKundwar Dhanpat Rai Publications

Reference Books:

- Internal combustion Engines J.B. Heywood Wiley
- Automotive Engines theory and servicing Halderman JD and Mitchell CD Pearson
- Internal Combustion Engines Theory & Practice Taylor GF MIT Press
- Introduction to IC Engines Richard Stone Society of Automotive Engr (Palgrave Mc Millan)

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Automobile engineer	Able to design and maintain Internal Combustion engine	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Automobile workshop

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 5th **Subject Code: 3TBME 504**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: DESIGN OF MACHINE ELEMENT **Theory Min. Marks:17**

COURSE OBJECTIVE:

1. To teach students how to apply the concepts of stress analysis, theories failure and material science to analyze, design and/or select commonly us machine components.
2. To illustrate to students the variety of mechanical components available a emphasize the need to continue learning.
3. To teach students how to apply mechanical engineering design theory identify and quantify machine elements in the design of commonly us mechanical systems.
4. To teach students how to apply computer based techniques in the analys design and/or selection of machine components.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Design for the Environment: Introduction, Environmental objectives, Global issues Regional and local issues, Basic DFE methods, Design guide lines, Example application, Lifecycle assessment, Basic method, Environmentally responsible product assessment, Weighted sum assessment method, Lifecycle assessment method, Techniques to reduce environmental impact, Design to minimize material usage, Design for disassembly, Design for recyclability, Design for remanufacture, Design for energy efficiency, Design to regulations and standards.	Classroom teaching ICT tools and Google classroom,
Unit – II	Shafts: Design of shaft under combined bending, twisting and axial loading; shock and fatigue factors, design for rigidity; Design of shaft subjected to dynamic load.	Classroom teaching ICT tools and Google classroom,
Unit – III	Design Considerations: Manufacturing and assembly considerations, Design of components for casting, Welding, Forging, hot and cold working, machining, Welding etc. Thermal considerations, Wear considerations in design, Contact Stresses, Standardization and preferred numbers. Power screws:- Power Screws design of power screw and power nut, differential and compound screw, design of simple screw jack.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Brakes & Clutches: Materials for friction surface, uniform pressure and uniform wear theories, Designof friction clutches: Disk , plate clutches, cone & centrifugal clutches. Design of brakes: Rope, band & block brake, Internal expending brakes, Disk brakes.	Classroom teaching ICT tools and Google classroom,
Unit - V	Flywheel: Introduction of fly wheel, Coefficient of Fluctuation of Speed, Fluctuation of Energy, Maximum Fluctuation of Energy, Coefficient of Fluctuation of Energy, Energy Stored in a Flywheel, Stresses in a Flywheel Rim, Stresses in Flywheel Arms, Design of Flywheel Arms, Design of Shaft Hub and Key, Construction of Flywheels.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understand the customers' need, formulate the problem and draw the design specifications.
- Understand component behaviour subjected to loads and identify the failure criteria.
- Analyze the stresses and strains induced in a machine element.
- Design a machine component using theories of failure.

Text Books:

- Machine Design R.S. Khurmi S. Chand
- Machine Design Shingley J.E TMH
- Design of Machine elements Sharma and Purohit PHI
- Machine Design Mubeen Khanna Publisher

Reference Books:

- Machine Design Wentzell Timothy H Cengage learning
- Design of Machine Elements Ganesh Babu K and Srithar k TMH
- Machine Design Sharma & Agrawal Kataria & sons

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Machine Design Engineer, Machine Design analyst.	Ability to developed the design analysis of various dynamic machine.	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	popular technical approach for analyzing and designing an application, system, or business.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 5th **Subject Code: 3TBME 505**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: DYNAMICS OF MACHINE **Theory Min. Marks:17**

COURSE OBJECTIVE:

Develop an ability to apply knowledge of mathematics, science, and engineering To develop an ability to design a system, component, or process to meet desir needs within realistic constraints.
To develop an ability to identify, formulate, and solve engineering problems
To develop an ability to use the techniques, skills, and modern engineering to necessary for engineering practice

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Dynamics of Engine Mechanisms:- Displacement, velocity and acceleration of piston; turning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed, analysis of flywheel.	Classroom teaching ICT tools and Google classroom,
Unit – II	Governor Mechanisms:- Types of governors, characteristics of centrifugal governors, gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertia governors.	Classroom teaching ICT tools and Google classroom,
Unit – III	Balancing of Inertia Forces and Moments in Machines:- Balancing of rotating masses, two plane balancing, determination of balancing masses (graphical and analytical methods), balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-line engines, V-twin engines, radial engines, Lanchester technique of engine balancing.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Friction:- Frictional torque in pivots and collars by uniform pressure and uniform wear rate criteria. Boundary and fluid film lubrication, friction in journal and thrust bearings, concept of friction circle and axis, rolling friction. Clutches: Single plate and multi plate clutches, Cone clutches.	Classroom teaching ICT tools and Google classroom,
Unit - V	Belt drives:- Velocity ratio, limiting ratio of tension; power transmitted; centrifugal effect on belts, maximum power transmitted by belt, initial tension, creep; chain and rope drives; Brakes: Band brake, block brakes, Internal and external shoe brakes, braking of vehicles. Dynamometer: Different types and their applications.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understand and conduct static and dynamic force analysis of Mechanisms.
- Apply the concept of balancing and use it for reducing the unbalanced forces in rotating masses and reciprocating engines under operating conditions exposure to IS standards.
- Acquire knowledge on types of vibrations in different systems.
- Apply different damping methods to minimize vibrations using IS standards.
- Understand, apply and analyze the control mechanisms in Governors and Gyroscopes.

List of Experiment (PI. expand it):

1. Study of various models of governors.
2. Study of gyroscopic motion and calculation of value of gyroscopic couple.
3. Study of various types of Cams and followers and drawing the cam profile with the help of test kit.
4. Study of various first order vibration systems.
5. To study working of friction clutches using models.
6. To study working model of dynamics balancing of rotating mass.

Text Books:

- Theory of machines R.S. Khurmi S. Chand
- Mechanism and Machine Theory Ambekar, AGPHI
- Theory of machines Rattan SS TMH
- Design of Machine elements Sharma and Purohit PHI

Reference Books:

- Theory of Mechanisms and Machines Ghosh and Mallik Affiliated East-West Press, Delhi
- kinematics and dynamics of machinery Norton RL TMH
- Theory of Machines Balaney Khanna publication

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer in Automobile Industry. Design Engineer in Manufacturing Industry. Product Management.	--Able to design the simple machine parts and elements. --Able to choose the suitable material for a product.	. Goal04(Quality education) Goal08(Decent work and economic growth)	--Can design his own product and sell it to the market. --Can give the services for the specific industry related to design of machines.

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 5th **Subject Code: 3TBME 506**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Software Lab- III (COMPUTER AIDED ENGINEERING LAB) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

Course Objective In this course, mainly it is aimed to provide students with the writing and reading principles of "Engineering Drawing", which is a graphical universal language used in technical world for describing the shape and size of an object via supplying orthographic views and/ or solid models associated with all the necessary dimensions, associated tolerances and annotations created in a CADD environment

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Methods to solve engineering problems:- Analytical, numerical, experimental, their merits and comparison, discretization into smaller elements and effect of size/ shape on accuracy, importance of meshing, boundary conditions, Computer Aided Engineering (CAE) and design, chain-bumping-stages vs concurrent-collaborative design cycles, computer as enabler for concurrent design and Finite Element Method (FEM), degree of freedom (DOF), mechanical systems with mass, damper and spring, stiffness constant K for tensile, bending and torsion; Practical applications of FEA in new design, optimization/ cost-cutting and failure analysis.	Classroom teaching ICT tools and Google classroom,
Unit – II	Types of analysis in CAE, static (linear/ non linear), dynamic, buckling, thermal, fatigue, crash NVH and CFD, review of normal, shear, torsion, stress-strain; types of forces and moments, tri-axial stresses, moment of inertia, how to do meshing, 1- 2-3-d elements and length of elements; force stiffness and displacement matrix, Rayleigh-Ritz and Galerkin FEM; analytical and FEM solution for single rod element and two rod assembly.	Classroom teaching ICT tools and Google classroom,
Unit – III	Two-dimension meshing and elements for sheet work and thin shells, effect of mesh density and biasing in critical region, comparison between tria and quad elements, quality checks, jacobian, distortion, stretch, free edge, duplicate node and shell normal.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Three-dimension meshing and elements, only 3 DOF, algorithm for tria to tetra conversion, floating and fixed trias, quality checks for tetra meshing, brick meshing and quality checks, special elements and techniques, introduction to weld, bolt, bearing and shrink fit simulations, CAE and test data correlations, post processing techniques.	Classroom teaching ICT tools and Google classroom,
Unit - V	Review of linear optimization, process and product optimization, design for manufacturing (DFM) aspects in product development, use of morphing techniquein FEA, classical design for infinite life and design for warranty life, warranty yard meetings and functional roles, climatic conditions and design abuses, case studies.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

Learning Outcomes Having successfully completed this course; the student will be able to:

- Draw two-dimensional sketches, views in CAD environment (particularly in AutoCAD and Autodesk Inventor)
- Create solid models of objects; objects in basic shapes, composite bodies, custom built machine parts, building modules etc.
- Draw the orthographic views of an object in CAD environment (particularly in Autodesk AutoCAD environment).
- Create the orthographic views of an object from the solid model (particularly in Autodesk Inventor environment).
- Dimension the views, show some annotations, provide the size tolerance of functional features, and general tolerances
- Explain and interpret the dimensions and the associated tolerances, some annotations
- Read the given orthographic views; i.e. visualize the 3- Dimensional model of the object shown to its orthographic views and create its CAD model.

Text Books:

- Learn Auto Cad in easy waySunil K. PandeyUnitechbooks
- Beginning Auto Cad Cheryl R. Shrock BPB Publication

Reference Books:

- Auto Cad expert Reynaldo & Tagore Autodesk
- Auto cad 2017George Omura SYBEX

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design officer, Manager, Production engineer	Creative designing for different parts of automobile, problem solving for failure and fault.	Goal08(Decent Work and Economical Growth)	Show rooms, industries, garage shop and manufacturing industries.power plant

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SEMESTER- 5th **Subject Code: 3STME 507**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Skill Elective- III(CNC PROGRAMMING & MACHINING) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

This course introduces the concepts and capabilities of computer numerical cont machine tools. Topics include setup, operation, and basic applications. Up completion, students should be able to explain operator safety, machine protectio data input, program preparation, and program storage.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Computer Numerical Control (CNC) Numerical control, Functions of a machine tool, Concept of numerical control, Historical Development Definition, Advantages of CNC machine tools, Evolution of CNC , Advantages of CNC Limitations of CNC , Features of CNC, The Machine Control Unit (MCU) for CNC Classification of CNC Machine Tools CNC MACHINING CENTERS Classification and Features Of CNC Machining Centres.	Classroom teaching ICT tools and Google classroom,
Unit – II	Blue print reading: Reading the machining sketches, Different Geometrical Tolerance symbols, Reading Dimensional Tolerances, Understanding the Views, Concept of First angle & Third angle projection.	Classroom teaching ICT tools and Google classroom,
Unit – III	Auto CAD basic (ACAD-01) Sketching Points line, Circles & Arcs, Simple exercises based on above, Isometric Views, Splines & poly lines, Identifying the points in given drawing.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Conventional milling Awareness: Introduction to milling machine & its parts, Different operations of milling. Plain milling, Step milling, Slot milling, Pocket milling, Co-ordinate drilling, Job setting in vice by dialling, Job setting on bed with clamps, Knowledge of different cutting tool materials used Selecting speed feeds & depth of cut ,Indexing(simple & compounding)	Classroom teaching ICT tools and Google classroom,
Unit - V	CNC Turning: Work piece setting methods, Tool setting methods, Practice on CNC Turning, Exercises on machine & Practice.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understand ASA and ORS systems of tool geometry and their inter-relations.
- Develop relations for chip reduction coefficient, shear angle, shear strain, forces, power, specific energy and temperature in orthogonal cutting.
- Select cutting fluids, tool materials and coatings to control tool wear and temperature.
- Evaluate cutting speed to minimize production cost and maximize production rate.
- Understand the working principles, applications and importance of modern machining processes

Text Books:

- CNC Machining and programming Thomas M. CrandellDavid Gibbs
- Manufacturing Automation Yusuf Altintas Dhanpatrai

Reference Books:

- CNC Machining Handbook James MadisonIndustrial Press Publication
- CNC Machining Handbook Alan Overby Mc Graw Hill Education
- Fundamentals of Metal Cutting and Machine Tools B. L. Juneja, Nitin Seth New Age International

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design officer, Manager, Production engineer	Creative designing for different parts of automobile, problem solving for failure and fault.	Goal08(Decent Work and Economical Growth)	Show rooms, industries, garage shop and manufacturing industries.power plant

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SEMESTER- 5th **Subject Code: 3STCE-507**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Skill Elective- I (WASTE MANAGEMENT) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

- Understanding of problems of municipal waste, biomedical waste, hazardous waste, ewaste, industrial waste etc.
- Knowledge of legal, institutional and financial aspects of management of solid wastes.
- Become aware of Environment and health impacts solid waste mismanagement
- Understand engineering, financial and technical options for waste management

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Waste management: the definition of waste, and its classification in the context of EU legislation, policy and other drivers for change, including the planning and permitting regime for the delivery of waste management solutions.	Classroom teaching ICT tools and Google classroom,
Unit – II	Specific waste streams including healthcare wastes, food wastes, mineral and mining wastes, hazardous wastes and producer responsibility wastes Interface of waste and resource management and civil engineering in the context of sustainable waste management in global cities and developing countries.	Classroom teaching ICT tools and Google classroom,
Unit – III	Waste treatment technologies including waste incineration and energy from waste, advanced conversion technologies of pyrolysis and gasification, anaerobic digestion, composting and mechanical biological treatment of wastes	Classroom teaching ICT tools and Google classroom,
Unit – IV	Health considerations in the context of operation of facilities, handling of materials and impact of outputs on the environment	Classroom teaching ICT tools and Google classroom,
Unit - V	Advances in waste recycling and recovery technologies to deliver added-value products Landfill engineering and the management of landfill leach ate and the mining of old landfills.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

After completion of the course students should be able to-do sampling and characterization of solid waste; analysis of hazardous waste constituents including QA/QC issues; understand health and environmental issues related to solid waste management; apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste transport, treatment and disposal techniques; economics of the onsite vs. offsite waste management options

Text Books:

- Waste: A Handbook for ManagementTrevor M. Letcher, Daniel Vallero Academic press
- Environment Waste Management Ram Chandra CRC Press
- Waste ManagementBernd Bilitewski, Georg Härdtle, Klaus MarekAcademic press

Reference Books:

- Chemistry for Environmental Engg Sawyer & Mc Carty Mc Graw Hill Book Company New Delhi
- Waste Management: A ReferenceHandbookJacqueline VaughnMc Graw Hill Book Company

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design officer, Manager, Production engineer	Creative designing for different parts of automobile, problem solving for failure and fault.	Goal08(Decent Work and Economical Growth)	Show rooms, industries, garage shop and manufacturing industries.power plant

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3TBME 601**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: TURBO MACHINERY **Theory Min. Marks:17**

COURSE OBJECTIVE:

The course aims at giving an overview of different types of turbomachinery used for energy transformation, such as pumps, fans, compressors, as well as hydraulic, steam and gas-turbines. It will focus on applications in power generation, transport, refrigeration and the built environment

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Energy transfer in turbo machines: Application of first and second laws of thermodynamics to turbo machines, moment of momentum equation and Euler turbine equation, principles of impulse and reaction machines, degree of reaction, energy equation for relative velocities, one dimensional analysis only.	Classroom teaching ICT tools and Google classroom,
Unit – II	Steam turbines: Impulse staging, velocity and pressure compounding, utilization factor, analysis for optimum U.F Curtis stage, and Rateau stage, include qualitative analysis, effect of blade and nozzle losses on vane efficiency, stage efficiency, analysis for optimum efficiency, mass flow and blade height. Reactions staging: Parson's stages, degree of reaction, nozzle efficiency, velocity coefficient, stator efficiency, carry over efficiency, stage efficiency, vane efficiency, conditions for optimum efficiency, speed ratio, axial thrust, reheat factor in turbines, problem of radial equilibrium, free and forced vortex types of flow, flow with constant reaction, governing and performance characteristics of steam turbines.	Classroom teaching ICT tools and Google classroom,
Unit – III	Water turbines: Classification, Pelton, Francis and Kaplan turbines, vector diagrams and work-done, draft tubes, governing of water turbines. Centrifugal Pumps: classification, advantage over reciprocating type, definition of mano-metric head, gross head, static head, vector diagram and work done. Performance and characteristics: Application of dimensional analysis and similarity to water turbines and centrifugal pumps, unit and specific quantities, selection of machines, Hydraulic, volumetric, mechanical and overall efficiencies, Main and operating characteristics of the machines, cavitations.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Rotary Fans, Blowers and Compressors: Classification based on pressure rise, centrifugal and axial flow machines. Centrifugal Blowers Vane shape, velocity triangle, degree of reactions, slip coefficient, size and speed of machine, vane shape and stresses, efficiency, characteristics, fan laws and characteristics. Centrifugal Compressor - Vector diagrams, work done, temp and pressure ratio, slip factor, work input factor, pressure coefficient, Dimensions of inlet eye, impeller and diffuser. Axial flow Compressors- Vector diagrams, work done factor, temp and pressure ratio, degree of reaction, Dimensional Analysis, Characteristics, surging, Polytrophic and isentropic efficiencies.	Classroom teaching ICT tools and Google classroom,
Unit - V	Course Code: 3TBME- 601 Power Transmitting turbo machines: Application and general theory, their torque ratio, speed ratio, slip and efficiency, velocity diagrams, fluid coupling and Torque converter, characteristics, Positive displacement machines and turbo machines, their	Classroom teaching ICT tools and Google classroom,

	distinction. Positive displacement pumps with fixed and variable displacements, Hydrostatic systems hydraulic intensifier, accumulator, press and crane.	

COURSE OUTCOME:

Describe turbo machines and their differences with positive displacement machines. Review of dimensional analysis and laws of thermodynamics Discuss effect of thermodynamics on turbo machines. Explain reheat, preheat, and polytrophic efficiencies for turbines and compressors Describe the Euler turbine equation and its application with degree of reaction for different turbo machines Describe velocity triangles and general analysis of pumps and compressors Describe different hydraulic turbines, steam turbines and solve problems Describe working of centrifugal pumps, compressors and solve problems

Text Books:

- Turbo machinery Venkanna BK PHI
- Turbo machinery Kadambi V Manohar Prasad Wiley Eastern Delhi
- Fluid Mechanics & hydraulic Machines R.K. Bansal Mc Graw Hills
- Fluid Mechanics R Mohanty PHI

Reference Books:

- Fluid Mechanics K L Kumar PHI
- Fluid Mechanics & hydraulic Machines Modi &Seth Laxmi publication
- Multi Gas Turbine Theory Rogers Cohen & Sarvan Pearson
- Steam Turbine Kearton W. J Pearson
- Turbo machinery Shepherd DG Collier Macmillan Company

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Automobile engineer Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Start business Unit (retail and Micro) Service Consultancy

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SEMESTER- 6th **Subject Code: 3TBME 602**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: ENTREPRENEURSHIP AND MANAGEMENT CONCEPTS **Theory Min. Marks:17**

COURSE OBJECTIVE:

The Management Entrepreneurship/Small Business Management Option is a challenging, applicable degree program that integrates management concepts in a technical and innovative setting as required by today's dynamic business environment. The program develops graduates with relevant skills preparing students for entry into management careers in business, government, public, or social service organizations. Industry-trained faculty translate theory to practice; advising students through the diversity of the curriculum, project-based learning, and internships. The degree serves those students that seek a personal, hands-on learning experience and the needs of the businesses that employ them.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	System Concepts:- Types, definition & characteristics; supra & subsystems, key component; boundary & interface complexity; feedback (pull) & feed forward (push) controls, open flexible-adaptive system, computer as closed system, law of requisite variety; system coupling, stresses and entropy; functional & cross functional system; Steven Alter's nine element work system model and its comparison with IPO (input- processing-output) model, structure and performance of work systems leading to customer delight.	Classroom teaching ICT tools and Google classroom,
Unit – II	Management:- Importance, definition and functions; schools of theories, knowledge driven learning organization and e-business; environment, uncertainty and adaptability; corporate culture, difficulties and levels of planning, BCG matrix, SWOT analysis, steps in decision making, structured and unstructured decision; dimensions of organizations, size/specialization, behavior formalization, authority centralization, departmentalization, spam and line of control, technology and Minzberg organization typology, line, staff & matrix organization, coordination by task force, business process reengineering and process of change management, HR planning placement and training, MIS; attitudes and personality trait, overlap and differences between leader & manager, leadership grid, motivation, Maslow's need hierarchy and Herzberg two factor theory, expectation theory, learning process, team work and stress management.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Marketing:- Importance, definition, core concepts of need want and demand, exchange & relationships, product value, cost and satisfaction (goods and services) marketing environment; selling, marketing and societal marketing concepts; four P's, product, price, placement, promotion; consumer, business and industrial market, market targeting, advertising, publicity, CRM and market research. Finance:- Nature and scope, forms of business ownerships, balance sheet, profit and loss account, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis, pay-back period, NPV and capital budgeting.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Productivity and Operations: - Productivity, standard of living and happiness, types of productivity, operations (goods and services) Vs project management, production processes and layouts, steps in method improvement, time	Classroom teaching ICT tools and Google classroom,

	measurement, rating and various allowances; standard time and its utility, predetermined motion and timemethod, product and process specification, TQM, cost of quality, introduction to lean manufacturing (JIT), QFD, TPM & six sigma quality.	
Unit - V	Entrepreneurship:- Definition and concepts, characteristics, comparison with manager, classification, theories of entrepreneur, socio, economic, cultural and psychological; entrepreneur traits and behaviour, roles in economic growth, employment, social stability, export promotion and indigenization, creating a venture, opportunity analysis competitive and technical factors, sources of funds, entrepreneur development program.	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME:

- Describe the basic principles and concepts of management.
- Distinguish different plans and list steps in planning.
- Discuss the concepts of organizing and staffing.
- Interpret the concepts of directing and controlling.
- Demonstrate the meaning, functions, types and roles of an entrepreneur and describe various institutional support.
- Explain in detail about the small scale industries and prepare the project report.

Text Books:

- Fundamental of Entrepreneurship Mohanty SK PHI
- Financial Management Khan, Jain Khanna publication
- Management Information System Davis & Olson TMH.
- Management: Principles Bhatt Anil, Arya kumar Oxford higher education

Reference Books:

- The new era of management; Daft R Cengage
- Information systems Steven Alter Pearson
- Marketing management Kotler P Pearson

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3TBME 603**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: RENEWABLE ENERGY **Theory Min. Marks:17**

COURSE OBJECTIVE:

The course should enable the students to

- Understand the various forms of conventional energy resources.
- Learn the present energy scenario and the need for energy conservation
- Explain the concept of various forms of renewable energy
- Outline division aspects and utilization of renewable energy sources for both domestics and industrial application
- Analyze the environmental aspects of renewable energy resources.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Solar Radiation: Extra-terrestrial and terrestrial, radiation measuring instrument, radiation measurement and predictions. Solar thermal conversion: Basics, Flat plate collectors-liquid and air type. Theory of flat plate collectors, selective coating, advanced collectors, Concentrators: optical design of concentrators, solar water heater, solar dryers, solar stills, solar cooling and refrigeration. Solar photovoltaic: Principle of photovoltaic conversion of solar energy; Technology for fabrication of photovoltaic devices; Applications of solar cells in PV generation systems; Organic PV cells.	Classroom teaching ICT tools and Google classroom,
Unit – II	Wind energy characteristics and measurement: Metrology of wind speed distribution, wind speed statistics, Weibull, Rayleigh and Normal distribution, Measurement of wind data, Energy estimation of wind regimes; Wind Energy Conversion: Wind energy conversion principles; General introduction; Types and classification of WECS; Power, torque and speed characteristics; power curve of wind turbine, capacity factor, matching wind turbine with wind regimes; Application of wind energy.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Biomass: Production of biomass, photosynthesis-C3 & C4 plants on biomass production; Biomass resources assessment; Co2 fixation potential of biomass; Classification of biomass; Physicochemical characteristics of biomass as fuel Biomass conversion routes: biochemical, chemical and thermo-chemical Biochemical conversion of biomass to energy: anaerobic digestion, biogas production mechanism, technology, types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plant manure-utilization and manure values. Biomass Gasification: Different types, power generation from gasification, cost benefit analysis of power generation by gasification.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Small Hydropower Systems: Overview of micro, mini and small hydro system; hydrology; Elements of turbine; Assessment of hydro power; selection and design criteria of turbines; site selection and civil works; speed and voltage regulation; Investment issue load management and tariff collection; Distribution and marketing issues. Ocean Energy: Ocean energy resources, ocean energy routs; Principle of ocean thermal energy conversion system, ocean thermal power plants. Principles ofocean wave energy and Tidal energy conversion.	Classroom teaching ICT tools and Google classroom,

Unit - V	Geothermal energy: Origin of geothermal resources, type of geothermal energy deposits, site selection geothermal power plants; Hydrogen Energy: Hydrogen as a source of energy, Hydrogen production and storage. Fuel Cells: Types of fuel cell,fuel cell system and sub-system, Principle of working, basic thermodynamics	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME:

Upon completion of the course, the student will be able to

- Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
- Know the need of renewable energy resources, historical and latest developments.
- Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.
- Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
- Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications
- Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
- Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

List of Experiment :

1. Demonstration of different parts of solar cooker in details.
2.Demonstration of photovoltaic cell.
3.To find the efficiency of the flat plate solar collector.
4.To calculate the efficiency of photo-voltaic cell & draw the I-V characteristic of P-V cell.
5. Demonstration of IV & PV characteristic of PV module with variying radiation & temperature level.

Text Books:

- Renewable Energy Sources and Emerging Technologies Kothari, Singal & Rajan PHI Learn
- Non Conventional Energy Khan, B H TMH
- Solar Energy, Principles of Thermal Collection and Storagem Sukhatme and Nayak TMH
- Renewable Energy Resources: basic principle & application Tiwari and Ghosal Narosa Publ
- Energy Resources, Conventional & Non- Conventional Koteswara Rao BSP Publication

Reference Books:

- Solar Photovoltaics: Fundamental, technologies and Application Chetan Singh Solanki PHI
- Renewable Energy Sources Abbasi Tanseem andAbbasi SA PHI
- , Biomass, Energy and Environment Ravindranath NH and Hall DO Oxford University Press

- Solar Engineering of Thermal Process Duffie and Beckman, Wiley
- Green Power Nikolai, Khartchenko Tech Book International
- Sustainable Energy-Choosing Among Options Tester PHI Learning

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Automobile engineer Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3TBME 604**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: INDUSTRIAL ENGINEERING **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To impart capability of successfully planning, controlling, and implementing projects.
- Understand and apply the principles of maths, science, technology and engineering, involving industry relevant problems.
- Contribute to the profitable growth of industrial economic sectors by using IE analytical tools, effective computational approaches, and systems thinking methodologies.
- Maintain high standards of professional and ethical responsibility.
- Flourish and work effectively in diverse, multicultural environments emphasizing the application of teamwork and communication skills.
- Practice life-long learning to sustain technical currency and excellence throughout one's career.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: History & development, system approach, relationship with other departments Objective of Industrial Engineering, Place of Industrial engineering in an organization related discipline, management, OR, statistics, ergonomics, manufacturin engineering. Plant Location:- Need for a suitable location, urban, suburban, systems approach factors affecting location, quantitative method for evaluation of plant location. Plant Layout:- Objective & Principles, factors affecting layout, types of layout.	Classroom teaching ICT tools and Google classroom,
Unit – II	Work Study: Purpose, objectives and applications of work study, Productivity and work study. Method Study:- Introduction, procedure, charts, man-machine, flow process charts motion economy principles, micro motion study - Therbligs, cyclegraph. Work Measurement:- Definition, types, selection & timing the job, rating allowances, Normal and standard time determination, work sampling	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Job Evaluation & Merit Rating: Definition, objectives, methods, job rotation, job enlargement, job enrichment. Wages & Incentives:- Terminology, characteristics, factors, types of incentives, wag incentive plan, Rowan plan, Taylor's differential piece rate system, Emerson' efficiency plan, Halsey's 50-50 plan, Bedaux plan, Group task & Bonus system.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Information systems in organizations: Role id IS in Industry, increasing value of Information Technology, Internet worke enterprise, Internet, Intranet and Extranet, Globalization and IT, competitiv advantage with IT. Business Process Re-Engineering:- Definition, need & characteristics, Industria Engineering & Re-engineering, advantages of re-engineering.	Classroom teaching ICT tools and Google classroom,
Unit - V	Maintenance Management:	Classroom teaching ICT tools

	Objectives and need for maintenance, types of maintenance, breakdown, predictiv and preventive maintenance Equipment replacement policy:- Reasons for replacement, deterioration obsolescence, depreciation, method for depreciation calculation Value Engineering & Value Analysis:- Objectives & scope, application& techniques	and Google classroom,

COURSE OUTCOME:

- Ability to apply mathematics and science in Industrial engineering.
- Ability to design and conduct experiments, as well as to analyze and interpret data.
- Ability to identify, formulate and solve engineering problems.
- Ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice.
- Ability to design, develop, implement and improve integrated systems that include people, materials, information, equipment, and people.

EXPERIMENTS TO BE PERFORMED (MINIMUM TEN EXPERIMENTS)

1. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -men type flow process chart.
2. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -material type flow process chart
3. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method -machine type flow process chart
4. To prepare the charts & diagrams for a selected problem according to the existing method and an improved method – multiple activity chart.
5. Study of principles of fundamentals of hand motion.
6. Study & applications of principles of motion economy.
7. Performance of micro motion study of a job.
8. Problems in assignment of men & machines.
9. Training for a performance rating using walking exercises / audio visual aids.
10. Calculation of allowance for a job.
11. Standard time calculation problems.
12. Problems of wage incentive.
13. Case study of an industrial/service organization using a method study techniques.
14. Stop watch time study of a job.

Text Books:

- Industrial Engineering M.I. Khan New Age Publication
- Industrial Engineering and Production Management Martand Telsang S. Chand Publication
- Industrial Engineering and Production Management M. Mahajan Dhanpat Rai and Co.

Reference Books:

- Industrial and System Engineering Adedeji B. Badiru CRC Press
- Industrial Engineering Handbook Kjell B. Zandin Mc Graw Hill Standard

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3TBME 605**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: HEAT AND MASS TRANSFER **Theory Min. Marks:17**

COURSE OBJECTIVE:

This course is designed to introduce a basic study of the phenomena of heat and mass transfer, to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems and processes. A knowledge-based design problem requiring the formulations of solid conduction and fluid convection and the technique of numerical computation progressively elucidated in different chapters will be assigned and studied in detail. As well, to gain experience in designing experiments for thermal systems, the design, fabrication, and experimentation of a thin film heat flux gage will be attempted as part of laboratory requirements.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Basic Concepts: Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzman law; thermal resistance and conductance, analogy between flow of heat and electricity, combined heat transfer process; Conduction: Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates, thermal diffusivity, linear one dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical-insulation-thickness for pipes, effect of variable thermal conductivity.	Classroom teaching ICT tools and Google classroom,
Unit – II	surfaces (fins): Heat transfer from a straight and annular fin (plate) for a uniform cross section; error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications; Unsteady heat conduction: Transient and periodic conduction, heating and cooling of bodies with known temperatures distribution, systems with infinite thermal conductivity, response of thermocouples.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Convection: Introduction, free and forced convection; principle of dimensional analysis, Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient using databook.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Heat exchangers: Types- parallel flow, counter flow; evaporator and condensers, overall heat transfers coefficient, fouling factors, long-mean temperature difference (lmtd), method of heat exchanger analysis, effectiveness of heat exchanger, NTU method Mass transfer: Fick's law, equi-molar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Thermal radiation: Nature of radiation, emissive power, absorption, transmission, reflection and	Classroom teaching, ICT Based and individual

	emission of radiation, Planck's distribution law, radiation from real surfaces; radiation heat exchange between black and gray surfaces, shape factor, analogical electrical network, radiation shields. Boiling and condensation: Film wise and drop wise condensation; Nusselt theory for film wise condensation on a vertical plate and its modification for horizontal tubes; boiling heat transferphenomenon, regimes of boiling, boiling correlations.	presentation and Google classroom

COURSE OUTCOME:

- Apply the concepts of heat transfer in three modes to real problems
- Design heat exchangers and mass transfer systems
- Understand the basic laws of heat transfer.
- Account for the consequence of heat transfer in thermal analyses of engineering systems.
- Analyze problems involving steady state heat conduction in simple geometries.
- Develop solutions for transient heat conduction in simple geometries.
- Obtain numerical solutions for conduction and radiation heat transfer problems.
- Understand the fundamentals of convective heat transfer process.
- Evaluate heat transfer coefficients for natural convection.
- Evaluate heat transfer coefficients for forced convection inside ducts.
- Evaluate heat transfer coefficients for forced convection over exterior surfaces.
- Analyze heat exchanger performance by using the method of log mean temperature difference.
- Analyze heat exchanger performance by using the method of heat exchanger effectiveness.
- Calculate radiation heat transfer between black body surfaces.

List of Experiments (Pl. expand it):

1. Conduction through a rod to determine thermal conductivity of material.
2. Free convection from extended surfaces.(pin fin apparatus)
3. Parallel flow and counter flow heat exchanger effectiveness and heat transfer rate.
4. Experimental determination of Stefen-Boltzman constant.
5. To determine the total thermal resistance of a composite wall.
6. To determine the thermal conductivity of insulating powder.
7. To find the coefficient of heat transfer from shell & tube heat exchanger.
8. To find out the critical radius of insulating material.
9. To find regenerative heat.
10. To find the average surface heat transfer coefficient for a pipe losing heat by force convection.

Text Books:

- Calculate radiation heat exchange between gray body surfaces.
- Heat and mass transfer Kumar DS SK Kataria and Sons Delhi.
- Fundamentals of engineering heat and mass transfer Sachdeva RC New Age International Publisher
- Heat Transfer Dutta Binay KPHI
- Heat transfer Holman JP TMH
- Heat and mass transfer R.S. Khurmi S. Chand

Reference Books:

- Heat and mass transfer Sukhatme SP University Press Hyderabad
- Heat transfer Kreith Cengage
- Engineering heat transfer Gupta & Prakash University Press

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer for power plant	Able to design various heat transfer device.	Goal-12(Responsible Consumptions and Production)	Maintenance and design work for heat transfer device

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3TBME 606**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Software Lab-IV(CATIA) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

Parametric solid modeling, free-form surface modeling, reverse engineering, styling, and computer aided industrial design, engineering drawing and drafting, product and manufacturing information, reporting and analytics, verification and validation, knowledge based engineering, reuse, sheet metal design, assembly modeling, digital mock ups, simulation, stress analysis, finite element method, kinematics, complete fluid dynamics, thermal analysis.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to CATIA Introduction to CATIA CATIA Workbenches System Requirements Getting Started with CATIA Important Terms and Definitions Understanding the Functions of the Mouse Buttons Toolbars Hot Keys Color Scheme	Classroom teaching ICT tools and Google classroom,
Unit – II	Drawing Sketches in the Sketcher Workbench-I The Sketcher Workbench Starting a New File Invoking the Sketcher .Modifying the Grid Settings Understanding Sketcher Terms Specification Tree Grid Snap to Point Construction/Standard Element Select Toolbar Inferencing Lines	Classroom teaching ICT tools and Google classroom,
Unit – III	Drawing Sketches in the Sketcher Workbench Filleting Sketched Elements Chamfering Sketched Elements Mirroring Sketched Elements Mirroring Elements without Duplication Translating Sketched Elements Rotating Sketched Elements Scaling Sketched Elements Offsetting Sketched Elements Modifying Sketched Elements Deleting Sketched Elements.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Constraining Sketches and Creating Base Features Constraining Sketches Concept of Constrained Sketches Iso-Constraint Under-Constraint Over-Constrained Inconsistent Not Changed Applying Geometrical Constraints Applying Geometrical Constraints.	Classroom teaching ICT tools and Google classroom,
Unit - V	Other Tools Reference elements and sketch-based features. Creating dress-up and hole features. Editing features. transformation features and advanced modeling tools-I. Advanced modeling tools-II. Working with the wireframe and surface design workbench. Assembly modeling. working with the drafting workbench-I. Working with sheet metal components	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Student will have advanced solutions for conceptual design, 3D modeling, and documentation.
- Student will learn product designing, industrial designing and styling (optimize form, fit, & function and user experience), streamline 2D design, drafting, and documentation with powerful tools for layout, drawing, and 3D annotation.

- Student will do assembly designing, sheet metal designing, and template based designing.
- Student will have the knowledge to perform CAE geometry editing, comprehensive meshing, multi-CAE environments, fine element assembly management.
- Student can perform visual analysis and validation which will give them high quality performance insights for product decisions.

Text books:

- CATIA for Engineers and Designers Prof. Sam Tickoo Dream Tech Press,USA
- Basics in CATIA V5 with Simulation Book B.P. Sharma GVPH Publishers, New Delhi
- Engineering Graphics And Design Kaushik Kumar Vikas Publication

Reference books:

- Basics in Catia with Simulation R. P. Sharma Global Vision Publishing House

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer for power plant	Able to design various heat transfer device.	Goal-12(Responsible Consumptions and Production)	Maintenance and design work for heat transfer device

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3STME 607**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Skill Elective-IV (ANSYS Workbench) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

The primary objective of this Ansys Workbench Mechanical Training class is to teach participants Finite Element Analysis using the Ansys Workbench platform. Thus, upon completion of this course, participants will be able to setup, solve, and diagnose their own Structural and Thermal Analyses in the Ansys Mechanical Workbench

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Using ANSYS Introduction to the Finite Element Method, History of Finite Element Method, General Steps of the Finite Element Method, Explanation of 1D, 2D and 3D Elements with examples of ANSYS Elements Need of FEM, Enlisting different FEM methods and detailed explanation of any one, Derivation of stiffness matrix equation, Types of analysis that can be done using ANSYS, Advantages of the Finite Element Method, Limitations of FEA,ANSYS Family of products with their capabilities, Types of analysis that can be done with ANSYS, Introduction to the Ansys GUI, Operation Modes of Ansys, Product Launcher, Launcher Tasks, Use Custom Memory Settings, Launcher Menu Options, The Icon Toolbar Menu, Quitting Ansys	Classroom teaching ICT tools and Google classroom,
Unit – II	Selection Logic: Plotting, Pan-Zoom-Rotate, Picking, Coordinate Systems, Select Logic Solid Modelling: An Overview of Solid Modelling Operations, Working with Boolean operations, Working Plane Importing of 3D models	Classroom teaching ICT tools and Google classroom,
Unit – III	Meshing Free meshing or Mapped meshing, Setting Element Attributes, Selecting Element Type, Shape Function, Defining Element Types, Real Constants, Defining Section Properties, Assigning Element Attributes before meshing, Mesh Controls, The ANSYS Mesh Tool, Smartsizing, Meshing, Free Meshing, Mapped Meshing, Hybrid meshing, Mesh Extrusion, Volume Sweeping Material Properties: Material Library, Specifying properties Boundary Conditions: Types of Loads, Applying loads	Classroom teaching ICT tools and Google classroom,
Unit – IV	Solvers Types of Solvers, Solver Setup, Load Step Options, Solving Multiple Load Steps Post-processing Contour Plot Viewing, Path Operations, Estimating Solution Error, Time History Postprocessor (POST26), Report Generator	Classroom teaching ICT tools and Google classroom,
Unit - V	Tips & Tricks Using the Toolbar & Creating Abbreviations, Introduction to APDL, Using Parameters, Using the Start File, Using the Session Editor, Using Input Files ANSYS Workbench Introduction to ANSYS Workbench, Graphical User Interface, Static Structural Analysis, Modal Analysis, Thermal Analysis, Contact Recognition	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- You will be know how to simulate and validate the performance of products of all manufacturing sectors including automotive, power electronic products, electronic equipment, electromechanical devices, and electrical systems.
- You will know how to simulate every structural aspect, including linear static analysis, of a single part of a complex assembly with hundreds of components interacting through contacts or relative motions.
- You will know how to perform fluid flow analysis to know the impact of fluid flows on your product while manufacturing and when used by customers in real world applications.
- With your mastery in simulation, you will contribute not only to success of products but also cost management, product integrity, designing smart products, and reduced time-to-market.

Text books:

- Finite element analysis; Schaum series Buchanan TMH
- Textbook of finite element analysis Seshu P PHI
- Finite element analysis, theory and programming Krishnamoorthy TMH
- Practical finite element analysis; finite to infinite Gokhle nitin; et al Budhwar peth, Pune

Reference books:

- Finite element analysis: theory and application with ANSYS Saeed MoaveniPearson
- Finite element analysis of composite materials using ANSYSEver j. Barber CRC Press
- Introduction to finite element method Desai ChandrakantPHI
- The finite element method Zien kiewicz TMH
- An introduction to finite element method Reddy TMH

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 6th **Subject Code: 3STCE 607**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: Skill Elective-IV (Quantity Estimation & Bill Preparation) **Theory Min. Marks: 12**

COURSE OBJECTIVE:

A. Familiarize the student with the various parts and aspects of a complete set of Construction Documents.
B. To familiarize the student with the methods used to obtain a reasonable cost estimate and be aware of some current cost figures.
C. To sensitize the student to the cost of construction to become aware and more critical of methods and materials used in his designs.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Indian Contracts Act, Elements of Contracts, Types of Contracts, Features, Suitability, Design of Contract Documents, Tenders, Bidding, Evaluation of Tender from Technical.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	Basic Concepts in the Development of Construction Plans, Defining Work Tasks, the Cost Control Problem, the Project Budget, Forecasting for Activity Cost Control.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Financial Accounting Systems, Control of Project Cash Flows, Schedule Control, Schedule and Budget Updates, Relating Cost and Schedule Information.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Preparation of material bills, Rent analysis for different construction work, filling the Measurement Book, analysis of SOR, CSR, DSR.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Estimation of machinery and equipments, output estimation, salvage and scrap value determination, maintenance cost estimation.	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME:

- Arrange and prepare, from material and labor take-off list, a complete estimate.
- Explain responsibilities and ethics of an estimator.
- Demonstrate, define and explain the use of a construction spread sheet for estimating.
- Understand and relate the theory of estimating for building construction as related to the structure of plans and specifications estimates.
- Demonstrate, define and explain quantity surveying, unit cost synthesis and analysis, bid organization and preparation

Text Books:

- Estimating in Building Construction Steven J. Peterson Pearson Education
- Estimating in Building ConstructionFrank R. Dagostino Pearson Education

Reference Books:

- Elements of Quality Surveying Sandra lee, William Trench Willey Publication

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 701 (A)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: Professional Elective-I (MACHINE TOOL DESIGN) **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To impart knowledge about cutting tool geometry, tool material, mechanics of metal cutting, machinability and importance of cutting fluid.
- To understand the kinematics drive of machine tool.
- To design speed gear box and feed gear box
- To understand the procedure of acceptance test of machine tool

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Cutting Tool – types, requirements, specification & application Geometry of Single Point Cutting Tool - tool angle, Tool angle specification system, ASA, ORS and NRS and inter-relationship. Mechanics of Metal Cutting Theories of metal cutting, Chip formation, types of chips, chip breakers, Orthogonal and Oblique cutting, stress and strain in the chip, velocity relations, power and energy requirement in metal cutting.	Classroom teaching ICT tools and Google classroom,
Unit – II	Machinability Concept and evaluation of Machinability, Mechanism of Tool failure, Tool wear mechanism, Tool life, Tool life equation, Machinability index, factors affecting machinability. Thermal Aspects in Machining and Cutting Fluid Source of heat in metal cutting and its distributions, temp measurement in metal cutting, function of cutting fluid, types of cutting fluid.	Classroom teaching ICT tools and Google classroom,
Unit – III	Design of Machine Tool Element Design of Lathe bed, Material and construction feature, various bed section, analysis of force under headstock, tail stock and saddle, torque analysis of lathe bed, bending of lathe bed, designing for torsional rigidity, use of reinforcing stiffener in lathe bed. Design of Guide ways, Material and construction features, overturning diagram, Antifriction guide ways.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Design of Speed Gear Box Drives in Machine Tool, classification, selecting maximum and minimum cutting speeds, speed loss, kinematic advantage of Geometric progression, kinematic diagrams, design of Gear Box of 6,9,12 and 18 speed.	Classroom teaching ICT tools and Google classroom,
Unit - V	Design of Feed Gear Box Elements of feed gear box, classification-Norton drive, draw key drive, Meander's drive, Design of feed gear box for longitudinal and cross feed and for thread cutting. Machine Tool Testing Testing, Geometrical checks, measuring equipment for testing, acceptance test for Lathe and Radial drilling machines.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Acquire knowledge and hands-on competence in the design and development of various machine tools used in manufacturing operations.

Text Books:

- Machine Design Shigley J.E TMH
- Design of Machine Elments BhandariVBTMH
- Design of Machine Elements Sharma CS and Purohit K PHI Learning
- Machine Design R.S. Khurmi S. Chand

Reference Books:

- Machine Design Hall and SomaniTMH
- Machine DesignWentzell TH Cegage Learning
- Machine DesignSharma & AgrawalTMH
- Machine Design Abdul Mubeen Khanna Publishers
- Fundamentals of Machine Component Design Juvinall RC, Marshek KM Wiley

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME-701(B)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: ENERGY MANAGEMENT & AUDIT **Theory Min. Marks:17**

COURSE OBJECTIVE:

The use of energy falls under this definition. The primary objective of energy management is to maximize profit and minimize costs by optimizing energy procurement and utilization, throughout the organization to minimize energy costs without affecting production and quality and to minimize environmental effects.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Energy Management: Concept of energy management, energy demand and supply, economic analysis; Duties and responsibilities of energy managers. Energy Conservation: Basic concept, energy conservation in Household, Transportation,Agricultural, service and Industrial sectors, Lighting, HAVC.	Classroom teaching ICT tools and Google classroom,
Unit – II	Energy Audit: Definition, need and types of energy audit; Energy management (Audit) approach: Understanding energy cost, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirement; Fuel & energy substitution; Energy audit instruments; Energy conservation Act; Duties and responsibilities of energy manager and auditors.	Classroom teaching ICT tools and Google classroom,
Unit – III	Material energy balance: Facility as an energy system; Method for preparing process flow; material and energy balance diagrams. Energy Action Planning: Key elements, force field analysis; Energy policy purpose, perspective, content, formulation, rectification	Classroom teaching ICT tools and Google classroom,
Unit – IV	Monitoring and Targeting: Definition monitoring & targeting; Data and information analysis. Electrical Energy Management: energy conservation in motors, pumps and fan systems; energy efficient motors.	Classroom teaching ICT tools and Google classroom,
Unit - V	Thermal energy management: Energy conservation in boilers, steam turbine and industrial heating system; Application of FBC; Cogeneration and waste heat recovery; Thermal insulation; Heat exchangers and heat pump; Building EnergyManagement.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Understood and acquired fundamental knowledge on the science of energy and on both the conventional and non-conventional energy technologies
- Acquired the expertise and skills needed for the energy monitoring, auditing and management, and for the development, implementation, maintenance and auditing of Energy Management Systems
- Become capable of analysis and design of energy conversion systems
- Acquired skills in the scientific and technological communications, and in the preparation, planning and implementation of energy projects

Text Books:

- Energy Management Audit and Conservation Barun Kumar De Vrinda Publications
- Energy Management Murphy & Mckay, BSP Books Pvt. Ltd.
- Energy Management Principle Smith CB Pergamon Press, New York.
- Optimising Energy Efficiency in Industry Rajan GG TMH
- Energy Management Callaghan P O McGraw-Hill Book Company

Reference Books:

- Handbook on Energy Audit and Management Amit Kumar Tyagi Tata Energy Research Institute.
- Study material for energy Managers and Auditors: Paper I to V Bureau of Energy Efficiency
- Energy Auditing and Conservation: Method, Measurement Hamies Hemisphere publication, Washington
- Industrial Energy Management Utilisation Witty, Larry C Hemisphere Publishers,Washington
- Energy Management and Conservation Handbook Kreith & Goswami CRC Press

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME-701(C)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: RELIABILITY & MAINTENANCE **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objective of the course is to provide the students with the fundamental concepts, the necessary knowledge and the basic skills related to systems reliability and systems maintenance function. The course intends to expose the students to the concept of reliability and to help them learn the techniques of estimating reliability and related characteristics of components/ systems. Moreover, it exposes them to the necessary engineering techniques used for analyzing, planning and controlling maintenance systems

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Basic Concepts of Reliability: Probability distributions used in maintenance engineering- Binomial, Poisson, Exponential, Normal, Log-normal, Gamma and Weibull distribution; failure rate, hazard rate, failure modes, MTTR, MTBF, MTTF	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – II	System Reliability Models: System reliabilityn-component series systems, mcomponent parallel systems and combined system; standby systems; K-out-of-m systems; redundancy techniques in system design; event space, decomposition (Key Stone), cut and tie sets, Markov analysis, reliability and quality, unreliability, maintainability, availability	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – III	Maintenance Concepts and Strategies: Introduction, maintenance functions and objectives, maintenance planning and scheduling, maintenance organization. General Introduction to Maintenance Types: Breakdown, emergency, corrective, predictive, and preventive; maintenance prevention; design-out maintenance, productive maintenance, shutdown maintenance and scheduled maintenance.	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit – IV	Condition Based Maintenance: Principles of CBM, pillars of condition monitoring, CBM implementation and benefits; condition monitoring techniques- visual monitoring, vibration monitoring, wear debris monitoring, corrosion monitoring, performance monitoring	Classroom teaching, ICT Based and individual presentation and Google classroom
Unit - V	Reliability Cantered Maintenance (RCM): Concept, methodology, benefits; Total Productive Maintenance: Evolution of TPM, TPM objectives, concept, pillars of TPM. Failure Modes and Effects Analysis (FMEA)/ Failure Modes, Effects and Criticality Analysis (FMECA): Overview, elements of FMECA, applications and benefits, risk evaluation, risk priority numbers, criticality analysis, process FMEA, qualitative and quantitative approach to FMECA; design FMEAand steps for carrying out design FMEA	Classroom teaching, ICT Based and individual presentation and Google classroom

COURSE OUTCOME:

- Understand the concepts of reliability, availability and maintainability
- Implement strategies for improving reliability of repairable and non-repairable systems

Text Books:

- An Introduction To Reliability & Maintainability Engineering Ebeling CE TMH
- Reliability Engineering Srinath L.S East West Press
- Reliability and Maintenance Engineering Mishra R.C New age International publisher

Reference Books:

- Reliability Engineering and life testing Naikan PHI
- Reliability in Engineering Design Kapur KC and Lamberson LR Wiley India
- Comprehensive Maintenance Management Telang AD and Telang A PHI
- Reliability Engineering Balaguruswamy TMH
- Engineering Maintainability Dhillon PHI

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME-701(D)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: SIMULATION & PROCESS MODELLING **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objectives of this course are-

- Introduce students to the simulation and modeling techniques
- To provide students with opportunities to develop basic simulation and modeling skills with respect to carrying out research projects using any simulation method on the computer. (Skills)

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to modelling and simulation: Modelling and simulation methodology, system modelling, concept of simulation; gaming; static, continuous and discrete event simulation.	Classroom teaching ICT tools and Google classroom,
Unit – II	Basic concept of probability, generation and characteristics of random variables, continuous and discrete variables and their distributions; mapping uniform random variables to other variable distributions; linear, nonlinear and stochastic models	Classroom teaching ICT tools and Google classroom,
Unit – III	Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula, birth death system, equilibrium of queuing system, analysis of M/M/1 queues. Introduction to multiple servers Queue models M/M/c Application of queuing theory in manufacturing and computer system	Classroom teaching ICT tools and Google classroom,
Unit – IV	System Dynamics modelling: Identification of problem situation, preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship, Simulation of system dynamics models.	Classroom teaching ICT tools and Google classroom,
Unit - V	Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of simulation software - Arena, Pro-model, SIMULA, DYNAMO,STELLA, POWERSIM.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

On successful completion of the course students will be able to:

- Understand fundamental concepts of computer simulation and its role in engineering problem solving.
- Develop and model engineering problems and apply procedures for modelling systems using ARENA framework.
- Appreciate the advantages of using simulation and modelling for taking decision in engineering problems.
- Understand the need to incorporate simulation and modelling considerations throughout the design and execution of a project aiming at understanding its limitations and ways of improvement.

Text Books:

- Simulation Modeling and Analysis Law AM and Kelton WDTMH
- System simulation Gordon G PHI Learningl
- PHI Learning; Simulation Using Promodel PHI Learning MG Hill
- Operations Research Taha H PHI.

Reference Books:

- Hand book of Simulation Banks J John Wiley
- Liberman GJ; Introduction to OR Hillier FS TMH.
- System Simulation with Digital Computer Deo N PHI Learning
- Applied Simulation Modeling Seila, Ceric and Tadikmalla Cengage

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 702**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: OPERATION RESEARCH **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To formulate and solve problems as networks and graphs.
- To develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transhipment problems.
- To solve the problems using special solution algorithms.
- To use CPM and PERT techniques, to plan, schedule, and control project activities.
- To construct linear integer programming models and discuss the solution techniques.
- To formulate pure, mixed, and binary integer programming models.
- To solve the integer programming models using branch-and-bound method.
- To explain why heuristics are used to solve some large-sacle integer programming problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction of operation research, Linear system and distribution models: Mathematical formulation of linear systems by LP, solution of LP for two variables only, special cases of transportation and assignment and its solution, Vogel's forward looking penalty method, cell evaluation degeneracy, use of SW Lindo, Tora, Excell	Classroom teaching ICT tools and Google classroom,
Unit – II	Supply chain (SCM): Definition, importance, expenditure and opportunities in SCM; integration of inbound, outbound logistics and manufacturing to SCM, flow of material money and information, difficulties in SCM due to local v/s system wide (global) optimization and uncertainties in demand and transportation; Bull-whip effect; customer value; IT, info-sharing and strategic partnerships; plant and warehouse-network configuration; supply contracts and revenue sharing; outsourcing; transportation, cross docking and distribution, forecasting models in SCM; coordination and leadership issues; change of purchasing role and vendor rating, variability from multiple suppliers.	Classroom teaching ICT tools and Google classroom,
Unit – III	Inventory models: Necessity of inventory in process and safety stock, problem of excess inventory and cycle time (=WIP/ Throughput), JIT/ lean mfg; basic EOQ/ EPQ models for constant review Q-system(S,s); periodic review, base stock P- system; service level, lead time variance and safety stock;; ABC, VED and other analysis based on shelf life, movement, size, MRP technique and calculations, lot sizing in MRP, linking MRP with JIT; evolution of MRP to ERP to SCM and e- business.	Classroom teaching ICT tools and Google classroom,
Unit – IV	(a) Waiting Line Models Introduction, Input process, service mechanism, Queue discipline, single server (M/M/1) average length and times by Little's formula, optimum service rate; basic multiple server models (M/M/s) (b) Competitive strategy: concept and terminology, assumptions, pure and mixed strategies, zero sum games, saddle point, dominance, graphical, algebraic and LP methods for solving game theory problems.	Classroom teaching ICT tools and Google classroom,

Unit - V	(a) Project Management :PERT and CPM, Project Management origin and use of PERT, origin and use of CPM, Application of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM), Determination of floats, Construction of time chart and resource labeling, Project cost curve and crashing in project management, Project Evaluation and review Technique (PERT). (b) Decision analysis: decision under certainty, risk probability and uncertainty; Hurwicz criteria; AHP- assigning weight and consistency test of AHP	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Evaluate the requirements for on-time delivery and manage logistics at optimum cost
- Design and evaluate supply chain network and procurement management in supply chain using information technology.

List of experiments (please expand it):

1. Use computer and software to solve problems contained in the syllabus
2. Case studies in SCM

Text Books:

- Quantitative Models In Operations and SCM Srinivasan G PHI Learning
- Supply Chain Management Mohanty RP and Deshmukh SG Wiley India
- Operations Research Sharma JK Macmillan
- Operations research Ravindran Wiley India
- Theory and problems of OR Bronson R THM

Reference Books:

- Introduction to Operations Research concept and cases Hillier FS and Liberman GJ TMH
- Designing and managing the supply chain Simchi-Levi, Keminsky TMH
- Operations research Taha H PHI
- Operations Research-Algorithms and Applications Sen RP PHI Learning
- Manufacturing planning and control for SCM Vollman, Berry et al TMH.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 703**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: REFRIGERATION & AIR CONDITIONING **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objectives of this course are to:

- Introduce students to basic use of Psychrometrics chart for Refrigerating and Air-Conditioning systems
- Provide students with opportunities to develop their knowledge of Refrigerating and Air-Conditioning systems design.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Principles and methods of refrigeration, freezing; mixture cooling by gas reversible expansion, throttling, evaporation, Joule Thomson effect and reverse Carnot cycle; unit of refrigeration, coefficient of performance, vortex tube & thermoelectric refrigeration, adiabatic demagnetization; air refrigeration cycles- Joule's cycle Boot-strap cycle, reduced ambient cycle and regenerative cooling cycles.	Classroom teaching ICT tools and Google classroom,
Unit – II	Vapour compression system: Vapor compression cycle, p-h and t-s diagrams, deviations from theoretical cycle, sub-cooling and super heating, effects of condenser and evaporator pressure on cop; multi-pressure system: removal of flash gas, multiple expansion & compression with flash inter cooling; low temperature refrigeration: production of low temperatures, cascade system, dry ice, production of dry ice, air liquefaction system,.	Classroom teaching ICT tools and Google classroom,
Unit – III	Vapour absorption system: Theoretical and practical systems such as aqua-ammonia, electrolux& other systems; (b) Steam jet refrigeration: Principles and working, simple cycle of operation, description and working of simple system, (c) refrigerants: nomenclature & classification, desirable properties, common refrigeration, comparative study, leak detection methods, environment friendly refrigerants and refrigerant mixtures, brine and its properties	Classroom teaching ICT tools and Google classroom,
Unit – IV	Psychrometric: Calculation of psychrometric properties of air by table and charts; psychrometric processes: sensible heating and cooling, evaporative cooling, cooling and dehumidification, heating and humidification, mixing of air stream, sensible heat factor; principle of air conditioning, requirements of comfort air conditioning, ventilation standards, infiltrated air load, fresh air load human comfort, effective temperature & chart, heat production & regulation of human body,	Classroom teaching ICT tools and Google classroom,
Unit - V	Air conditioning loads: calculation of summer & winter air conditioning load, bypass factor of coil, calculation of supply air rate & its condition, room sensible heat factor, grand sensible heat factor, effective sensible heat factor, dehumidifiedair quantity. Problems on cooling load calculation. Air distribution and ventilation systems	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- work on various refrigeration cycles and refrigeration components
- design air distribution systems and estimate cooling load for air conditioning

LIST OF EXPERIMENTS (PLEASE EXPAND IT):

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold storage
4. General Study Trane Air Condition (Package Type).
5. General Study of Electrolux Refrigeration
6. General Study One tone Thermax refrigeration unit.
7. General Study of Water cooler
8. General Study of Psychrometers (Absorption type)
9. General Study of Leak Detectors (Halide Torch).
10. General Study and working of Gas charging Rig.
11. General Study of window Air Conditioner.
12. General Study and working of V-C Air conditioning Test rig.
13. Experimentation on Cold Storage of Calculate COP & Heat Loss.
14. Experimentation on Vapor compression Air Conditioning test rig.
15. Changing of Refrigerant by using Gas Charging Kit.

Text Books:

- Refrigeration and Air Conditioning Arora CP TMH
- Refrigeration and Air ConditioningSapali SNPHI
- Basic Refrigeration and Air conditioning Ananthanarayan TMH
- Refrigeration and Air Conditioning Manohar Prasad New Age Pub
- Refrigeration and Air ConditioningR.S. Khurmi S. Chand

Reference Books:

- Refrigeration and Air Conditioning Ameen PHI
- Air conditioning Principles and systems: an energy approach Pita PHI
- Refrigeration and Air conditioningStoecker W.F, Jones J McGH, Singapore
- Refrigeration and Air Conditioning Jordan RC and Priester GB PHI USA
- Refrigeration and Air conditioning Arora RC PHI Learning

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 704**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: AUTOMOBILE ENGINEERING **Theory Min. Marks:17**

COURSE OBJECTIVE:

The student will be made to learn
- The anatomy of the automobile in general
- The location and importance of each part
- The functioning of the engine and its accessories, gear box, clutch, brakes, steering, axles and wheels
- Suspension, frame, springs and other connections
- Emissions, ignition, controls, electrical systems and ventilation

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Chassis & Body Engg: Types, Technical details of commercial vehicles, types of chassis, lay out, types of frames, testing of frames for bending & torsion on unutilized body frame, vehicle body and their construction, driver's visibility and methods for improvement, safety aspects of vehicles, vehicle aerodynamics, optimization of body shape, driver's cab design, body materials, location of engine, front wheel and rear wheel drive, four wheel drive.	Classroom teaching ICT tools and Google classroom,
Unit – II	Steering System: Front axle beam, stub axle, front wheel assembly, principles of types of wheel alignment, front wheel geometry viz. camber, Kingpin inclination, castor, toe-in and toe-out, condition for true rolling motion, centre point steering, directional stability of vehicles, steering gear, power steering, slip angle, cornering power, over steer & under steer, gyroscopic effect on steering gears. Transmission System: Function and types of clutches, single plate, multi-plate clutch, roller & spring clutch, clutch lining and bonding, double declutching, types of gear Boxes, synchroniser, gear materials, determination of gear ratio for vehicles, gear box performance at different vehicle speed, automatic transmission, torque converters, fluid coupling, principle of hydrostatic drive, propeller shaft, constant velocity universal joints, differential gear box, rear axle construction.	Classroom teaching ICT tools and Google classroom,
Unit – III	Braking system: Simple braking systems, disc theory, mechanical, hydraulic & pneumatic power brake systems, performance, self-energisation, air- bleeding of hydraulic brakes, types of wheels and tyres, tyre specifications, construction and material properties of tyres & tubes. Suspension system : Basic suspension movements, Independent front & rear suspension, shock absorber, type of springs: leaf spring, coil spring, air spring, torsion bar, location of shackles, power calculations, resistance to vehicle motion during acceleration and breaking, power & torque curve, torque & mechanical efficiency at different vehicle speeds.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Storage battery, construction and operation of lead acid battery, testing of battery, principle of operation of starting mechanism, different drive systems, starter relay switch, regulator electric fuel gauge, fuel pump, horn, wiper,	Classroom teaching ICT tools and Google classroom,

	Lighting system, head light dazzling, signaling devices, battery operated vehicles, choppers. importance of maintenance, scheduled and unscheduled maintenance, wheel alignment, trouble Shooting probable causes & remedies of various systems, microprocessor based control system for automobile, intelligent automobile control systems.	
Unit - V	Emission standards and pollution control: Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel quality standards, environmental management systems for automotive vehicles, catalytic converters, fuel additives, and modern trends in automotive engine efficiency and emission control.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Identify and distinguish different systems and components in an automobile. repair, troubleshoot and maintain an automobile.
- Recognize the role of forces, pressure and friction in vehicles, and their operations.
- Understand the engine auxiliary systems such as fuel injection system, electrical system and ignition system.
- Explain the working principles of different types of transmission system and suspension systems.
- Design and make an automotive device that addresses technological issues such as Hybrid, electric and alternative fuel

List of experiments

1. To Study of chassis
2. To Study of suspension System
3. To Study of steering mechanisms
4. To Study of transmission,
5. To Study of gear-box
6. To Study of differential systems
7. To Study of Electrical systems of various light and heavy automotive vehicles

Text Books:

- Automotive engines Srinivasan S TMH
- Automotive Engineering Kripal Singh Khanna Pub
- The Motor vehicle Newton & Steeds Society of Automotive Engineer

Reference Books:

- Automotive Mechanics Crouse TMH
- Internal Combustion Engines Gupta HN PHI
- Automotive Mechanics Joseph Heitner CBS Pub

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Manger	Able to understand and manage competition Understanding of consumer behavior & solving problem S Able to handle sales and queries	Goal-12(Responsible Consumptions and Production technique)	Start business Unit (retail and Micro) Service Consultancy

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 705**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: MECHANICAL VIBRATIONS AND NOISE ENGINEERIN **Theory Min. Marks:17**

COURSE OBJECTIVE:

To familiarize the students with the sources of vibration and concept of noise and make design modifications to reduce the vibration and noise and improve the life of the components.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Fundamental Aspects of Vibrations: Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems. Undamped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution of differential equation of motion: Natural frequency of vibration. Systems involving angular oscillations: the compound pendulum.	Classroom teaching ICT tools and Google classroom,
Unit – II	Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping.	Classroom teaching ICT tools and Google classroom,
Unit – III	Harmonically excited Vibration: One degree of freedom- forced harmonic vibration; vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration Isolation, force and motion transmissibility; absolute and relative motion of mass (Seismic Instruments). Whirling Motion and Critical Speed: Whirling motion and Critical speed: Definitions and significance .Critical -speed of a vertical, light -flexible shaft with single rotor : with and without damping .Critical speed of a shaft carrying multiple discs (without damping), Secondary critical speed.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Systems With Two Degrees of Freedom : Un-damped free vibration of 2 d.o.f and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrationswith harmonic excitation ; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration.	Classroom teaching ICT tools and Google classroom,
Unit - V	Noise Engineering - Subjective response of sound: Frequency and sound dependent human response; the decibel scale; relationship between, sound pressure level (SPL), sound power level and sound intensity scale; relationship between addition, subtraction and averaging, sound spectra and Octave band analysis; loudness; weighting networks; equivalent sound level, auditory effects of noise; hazardous noise, exposure due to machines and equipments; hearing conservation and damage risk criteria, daily noise doze. Noise: Sources, Isolation and Control: Major sources of noise on road and inindustries, noise due to construction equipments and domestic appliances,	Classroom teaching ICT tools and Google classroom,

	industrial noise control, strategies- noise control at source (with or without sound enclosures), noise control along the path (with or without partitions and acousticbarriers); noise control at the receiver, ear defenders, earplugs, semi-insert protectors.	

COURSE OUTCOME:

- Understanding causes, source and types of vibrations in machineries
- Gaining knowledge in sources and measurement standard of noise
- Ability to design and develop vibrations and noise control systems.

List of experiments (please expand it);

1. To verify the given relation, for a simple pendulum.

$T = 2\pi\sqrt{\frac{L}{g}}$

2. To determine the radius of gyration 'k' of given pendulum and to verify the relation

$T = 2\pi\sqrt{\frac{K^2+(OG)^2}{g(OG)}}$

3. To determine the radius of gyration of given bar by using Bi-Filar suspension.
4. To study the longitudinal vibrations of helical spring & to determine the frequency or period of vibration (oscillation) the theoretically & actually by experiment
5. To study the undamped free vibrations of equivalent spring mass system.
6. To study the forced vibrations of equivalent spring mass system.
7. To study the Torsional Vibration (undamped) of single Rotor shaft system.
8. To study the free vibration of two rotor system & to demermine the natural frequency of vibration theoretically & experimentally.
9. To study the damped torsional oscillations & determine the damping coefficient Ct.
10. To take measurements of sound Pressure Level (SPL) of a machine using Noise Level Meter.

Text Books:

- Mechanical Vibrations and Noise Engineering Ambekar A.G PHI
- Mechanical Vibrations Singiresu Rao Pearson Education
- Text book of Mechanical Vibrations Dukikipati RV Srinivas J PHI

Reference Books:

- Element of Vibration Analysis Meirovitch Leonard TMH
- Mechanical Vibration G.K. Grover, Nem chand and Bross , Roorkee
- Mechanical Vibrations; Schaum Series Kelly SG and kudari SK TMH
- Theory of Vibration with Applications Thomson , W.T C.B.S Pub & distributors

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer for power plant	Able to design various heat transfer device.	Goal-12(Responsible Consumptions and Production)	Maintenance and design work for heat transfer device

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 706**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: MINOR PROJECT **Theory Min. Marks: 12**

COURSE OBJECTIVE:

- To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
- To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
- To give students an opportunity to do something creative and to assimilate real life work situation in institution.
- To develop good expressions power and presentation abilities in students.

Syllabus:

Provision of Minor project can be made as preparation phase-I for major project or to take it as an independent small project.

COURSE OUTCOME:

- To expose students to a minor problem (academic) related any one of the following components viz. design of machine or machine component.
- To develop acumen for higher education and research.
- To master the art of working in group, and develop understanding of technical dissertation presentation and writing.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 7th **Subject Code: 3TBME 707**
Course: BE Mechanical **Theory Max. Marks: 25**
SUBJECT: INDUSTRIAL TRAINING /INTERNSHIP/IPR **Theory Min. Marks: 12**

COURSE OBJECTIVE:

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Syllabus:

Scheme of Studies:
Duration: Minimum 2 weeks in summer break after VI semester, assessment to be done in VII semester
Scheme of Examination:
For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Lab Work in Industry	**Marks Allotted**
Attendance and General Discipline	5
Daily diary Maintenance	5
Initiative and participative attitude during training	10
Assessment of training by Industrial Supervisor	10
Total	**30***

(b) Practical/Oral Examination (Viva-Voce) in Institution	**Marks Allotted**
1. Training Report	15
2. Seminar and cross questioning (defense)	15
Total	**30**

* Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.
During training students will prepare a first draft of training report in consultation with section in charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.
Learning through Industrial Training
During industrial training students must observe following to enrich their learning:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/equipment/instrument-their working and specifications.
- Product development procedure and phases.
- Project Planning, monitoring and control.
- Quality control and assurance.
- Maintenance system
- Costing system
- Stores and purchase systems.
- Layout of Computer/EDP/MIS centers.
- Roles and responsibilities of different categories of personnel.
- Customer services.

- Problems related to various areas of work etc. Students are supposed to acquire the knowledge on above by
- Direct Observations without disturbing personnel at work.
- Interaction with officials at the workplace in free/ tea time
- Study of Literature at the workplace (e.g. User Manual, standards, processes, schedules, etc.)
- "Hand's on" experience
- Undertaking/assisting project work.
- Solving problems at the work place.
- Presenting a seminar
- Participating in group meeting/discussion.
- Gathering primary and secondary data/information through various sources, storage, retrieval and analysis of the gathered data.
- Assisting official and managers in their working
- Undertaking a short action research work.
- Consulting current technical journals and periodicals in the library.
- Discussion with peers.

Daily Diary- Industrial Training
Name of the Trainee _____
College_____
Industry / work place_____
Week No_____
Department /Section_____
Date_____

Dates Brief of observations made, work done, problem/project undertaken, discussion held, literature consulted etc.

Signature of Supervisor (TPO/Faculty) Signature of Trainee Signature of Official in charge for Trg. In Indutry.

Supervision of Industrial Training
Faculty and TPO are supposed to plan industrial training in such a manner that students get exposure on most of the above area in the field.
One faculty member or TPO will plan industrial training of students in consultation with training manager of the industry (work place) as per the predefined objectives of training.
Monitoring visits will be made by training and placement officer/faculty in-charge for the group of students,of the college during training.
Guidance to the faculty / TPO for Planning and implementing the Industrial Training
Keeping in view the need of the contents, the industrial training program, which is spread to minimum 2 weeks duration, has to be designed in consultation with the authorities of the work place; Following are some of the salient points:

- Spelling out the objectives of the industrial training in behavioral terms and same is informed in advance to the 1) students, 2) authorities of the work place and 3) supervising faculty members.
- Discussing and preparing students for the training for which meetings with the students has to be planned.
- Meeting with industrial personnel and orienting them regarding the objective of the training and the expectations of the program.
- Correspondence with the authorities of the work place.
- Orientation classes for students on how to make the training most beneficial- monitoring daily diary, writing weekly reports, how to interact with various categories of industrial personnel, how to behave and undertake responsibilities, how to gather information form the workplace, ethics etc.
- Guiding students to make individual plans (week wise/ day wise) to undertake industrial training.,
- Developing a system of maintaining training records, by teachers for every batch of students for convenient retrieval.
- Inviting industrial personnel to deliver lectures on some aspects of training.

Action plan for planning stages at the Institutional Level

S.No. Activity Commencing Week Finishing week Remark

1. Meeting with Principal

2. Meeting with colleagues
3. Correspondence with work place(Industry concerned)
4. Meeting with authorities of work place
5. Orientation of students for industry training
6. Scrutinizing individual training plan of students.
7. Commencement of individual training
8. First monitoring of industrial training
9. Second monitoring of industrial training
10. Finalization of Training report
11. Evaluation of performance at industry level
12. Evaluation of Industry Program in the Institutions.

COURSE OUTCOME:

- To have extensive on-site exposure to various mechanical engineering aspects.
- To develop managerial skills of the students.
- To expose students to practical problems and learn troubleshooting methods.
- To develop an understanding of modern construction materials and techniques.
- To expose students to take up complex structural design and construction challenges.
- To develop confidence to take up a project activity independently.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME-801 (A)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: OPEN ELECTIVE (POWER PLANT ENGINEERING) **Theory Min. Marks:17**

COURSE OBJECTIVE:

- Describe sources of energy and types of power plants.
- Analyze different types of steam cycles and estimate efficiencies in a steam power plant.
- Describe basic working principles of gas turbine and diesel engine power plants.
- Define the performance characteristics and components of such power plants.
- List the principal components and types of nuclear reactors.
- Evaluate cycle efficiency and performance of a gas cooled reactor power plant.
- Classify different types of coupled vapor cycles and list the advantages of combined cycles power plant.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to methods of converting various energy sources to electric power, direct conversion methods renewable energy sources, solar, wind, tidal, geothermal, bio-thermal, biogas and hybrid energy systems, fuel cells, thermoelectric modules, MHD-Converter.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit – II	Fossil fuel steam stations: Basic principles of sitting and station design, effect of climatic factors on station and equipment design, choice of steam cycle and main equipment, recent trends in turbine and boiler sizes and steam conditions, plant design and layout, outdoor and indoor plant, system components, fuel handling, burning systems, element of feed water treatment plant, condensing plant and circulating water systems, cooling towers, turbine room and auxiliary plant equipment., instrumentation, testing and plant heat balance.	Classroom teaching ICT tools and Google classroom,
Unit – III	Nuclear Power Station: Importance of nuclear power development in the world and Indian context, Review of atomic structure and radio activity, binding energy concept, fission and fusion reaction, fissionable and fertile materials, thermal neutron fission, important nuclear fuels, moderators and coolants, their relative merits, thermal and fast breeder reactors, principles of reactor control, safety and reliability features	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit – IV	Hydro-Power Station: Elements of Hydrological computations, rainfall run off, flow and power duration curves, mass curves, storage capacity, salient features of various types of hydro stations, component such as dams, spillways, intake systems, head works, pressure tunnels, penstocks, reservoir, balancing reservoirs, Micro and macrohydro machines, selection of hydraulic turbines for power stations, selection of site.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit - V	Course Code: 3TBME- 801 (A) Power Station Economics: Estimation and prediction of load. Maximum demand, load factor, diversity factor, plant factor and their influence on plant design, operation and economics; comparison of hydro and nuclear power plants typical cost structures, simple problems on cost analysis, economic performance and tariffs, interconnected system and their advantages, elements of load dispatch in interconnected systems.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Various components and operations of different types of power plants will be understood.
- The applications of different types of power plants will be studied.

Text Books:

- Power plant Engg Nag PK TMH
- Power plant EnggSharma PC Kataria and sons, Delhi

Reference Books:

- Power plant TechnologyAl-Wakil MM TMH
- Power Plant Engg Domkundwar Dhanpatrai & sons

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer in various Industry.	Able to design the simple machine parts and elements. Able to choose the suitable material for a product.	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Design consultancy.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME-801 (B)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: OPEN ELECTIVE WORK STUDY & ERGONOMICS **Theory Min. Marks:17**

COURSE OBJECTIVE:

To provide basic understanding to the students exactly the concept and significance of work study and ergonomics. To inculcate analyzing skills among the students with respect to work place design, working postures and lifting tasks.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Method study: purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.	Classroom teaching ICT tools and Google classroom,
Unit – II	Work measurement: Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipments needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time. Work sampling: Basic procedure, design of work sampling study conducting work sampling study and establishment of standard-time.	Classroom teaching ICT tools and Google classroom,
Unit – III	Job evaluation and incentive schemes: Starlight line, Tailor, Merrick and Gantt incentive plans Standard data system; elemental and non-elemental predetermined motion systems, work factors system; Methods Time Measurement (MTM), MOST	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Human factor engineering: Definition and history of development of human factors engineering, types & characteristics of man-machine-system, relative capabilities of human being and machines; development and use of human factor data; information input and processing: Introduction to information theory; factors effecting information reception and processing; coding and selecting of sensory inputs.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	Display systems and anthropometric data: Display- types of visual display, visualindicators and warning signals; factorial and graphic display; general principles of auditory and tactral display, characteristics and selection.	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

- Identify the appropriate type of plant location, layout and material handling techniques
- Apply and implement the manufacturing planning and control strategies in industry

Text Books:

- work-study ILO International Labour Organization
- Industrial Ergonomics Khan MI PHI Learning
- Work study Currie RM BIM publications

Reference Books:

- Motion and Time Study Barrnes RM Wiley pub
- Contenmprory ergonomics Megaw ED Taylor & fracis
- Human Factors in Engg and design Sandera M and Mc Cormick E MGHill
- Hand book of Industrial Engg Mynard

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBCE-8101 (C)**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: CONSTRUCTION PLANNING & MANAGEMENT **Theory Min. Marks:17**

COURSE OBJECTIVE:

- Identify the key activities in the project life cycle.
- Recognize the components of a project charter and how to be appropriately scale them based on the size of a project.
- Understand the role of the "triple constraint" in project management and apply it in determining project scope.
- Keep projects on track by managing project risks and effectively using a communication plan.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Preliminary and detailed investigation methods: Methods of construction, form work and centering, Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.	Classroom teaching ICT tools and Google classroom,
Unit – II	Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – III	Contracts: Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.	Classroom teaching ICT tools and Google classroom,
Unit - V	Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.	Classroom teaching, ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

- Following this course, students will be able to describe a project life cycle, and can skillfully map each stage in the cycle
- Students will identify the resources needed for each stage, including involved stakeholders, tools and

supplementary materials

- Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
- Students will be able to provide internal stakeholders with information regarding project costs by considering factors such as estimated cost, variances and profits
- Students will be able to develop a project scope while considering factors such as customer requirements and internal/external goals

Text Books:

- Construction, Management & Accounts Harpal Singh Tata McGraw
- Construction Management S. Seetharaman Umesh Publications, Delhi.
- CPM L.S. Srinath East-West Press

Reference Books:

- CPM & PERT Weist & Levy PHI
- Tendering & Contracts T.A. Talpasai Tata McGraw
- Construction Equipment Peurify Mc Graw Hill

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME-801 (D)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: PRINCIPLES OF MANAGEMENT AND MANAGERIAL ECONOMICS **Theory Min. Marks:17**

COURSE OBJECTIVE:

The purpose of this course is to expose the student to the basic concepts of management in order to aid the student in understanding how an organization functions, and in understanding the complexity and wide variety of issues managers face in today's business firms. This is an introductory level management course that deals with the basic tenets of organization and management theory and practice. The course attempts to familiarize the student with the various functions, processes, and activities of management and to help the student appreciate the underlying theories that constitute the discipline of management. The is not intended to turn students into managers but it is expected that students successfully completing this course will be knowledgeable as to the historical, current, and future issues in management.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Management Concept: Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management.	Classroom teaching ICT tools and Google classroom,
Unit – III	Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision making under certainty Decision making under uncertainty, Decision Making under risk.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.	Classroom teaching ICT tools and Google classroom,
Unit - V	Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources	Classroom teaching ICT tools and Google classroom,

COURSE OUTCOME:

After the completion of the course, students will be able to –

- Understand the roles of managers in firms
- Understand the internal and external decisions to be made by managers
- Analyze the demand and supply conditions and assess the position of a company
- Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
- Analyze real-world business problems with a systematic theoretical framework.

- Make optimal business decisions by integrating the concepts of economics, mathematics and statistics.

Text Books:

- The Practice of Management. Peter Drucker Harper and Row
- Essentials of Management Koontz: PHI Learning.
- Management Staner PHI Learning.
- Principles of Management Daft Cengage Learning.
- Principle and Practice of Management T. N. Chhabra Dhanpat Rai, New Delhi

Reference Books:

- Managerial Economics Hirschey Cengage Learning.
- Industrial Organisation and Engineering Economics T. R. Banga and S.C. Sharma Khanna Publishers.
- Industrial Engineering and Management O.P. Khanna Dhanpat Rai.
- Managerial Economics Joel Dean PHI learning.
- Managerial Economics Concepts & Cases V. L. Mote, Samuel Paul and G.S. Gupta TMH, New Delhi.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3 TBME-802 (A)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: Professional Elective-II (MACHINE DESIGN-II) **Theory Min. Marks:17**

COURSE OBJECTIVE:

Applying scientific principles and concepts to the design of basic mechanical components and systems; improving problem solving and decision making abilities; obtaining design solutions to open-ended problems through a systematic design process.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Design of Belt, Rope and Chain Drives: Methods of power transmission, selection and design of flat belt and pulley; Selection of V-belts and sheave design; Design of chain drives, roller chain and its selection; Rope drives, design of rope drives, hoist ropes.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit – II	Design of Spur and Helical Gears: Force analysis of gear tooth, modes of failure, beam strength, Lewis equation, form factor, formative gear and virtual number of teeth; Gear materials; Surface strength and wear of teeth; strength against wear; Design of straight tooth spur and Helical Gears. Bevel Gears: Application of bevel, formative gear and virtual number of teeth; Force analysis; Lewis equation for bevel gears; Strength against wear; Design of bevel gear.	Classroom teaching ICT tools and Google classroom,
Unit – III	Design of Gear Box for Machine Tools: Comparison and Choice of progression (Arithmetic, Geometric, Harmonic and Logarithmic), general design procedure, determination and fixation of spindle speeds, selection of the best structure diagram, selection of gear layout and ray diagram, determination of number of teeth on gears.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit – IV	**Design of I.C. Engine Components**: General design considerations in IC engines; design of cylinder; design of piston and piston-rings; design of connecting rod; design of crankshaft.	Classroom teaching ICT tools and Google classroom,
Unit - V	Optimization: Basic concept of optimization, classification of optimization, optimization techniques, engineering applications of optimization. Classical optimization techniques: unconstrained optimization single-variable optimization,multivariable optimization, solution by direct search method, solution by Lagrange- multipliers method.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

Upon completion of this course, the students can able to successfully design machine components.

Text Books:

- Machine Design Shigley J.E TMH

- Design of Machine Elments BhandariVB TMH
- Design of Machine Elements Sharma CS and Purohit K PHI Learning
- Machine Design R.S. Khurmi S. Chand

Reference Books:

- Machine Design Hall and Somani TMH
- Machine Design Wentzell TH Cegage Learning
- Machine Design Sharma & Agrawal TMH
- Machine Design Abdul Mubeen Khanna Publishers
- Fundamentals of Machine Component Design JuvinallRC, Marshek KM Wiley

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Design Engineer in various Industry.	Able to design the simple machine parts and elements. Able to choose the suitable material for a product.	Goal 09(Industry innovation and infrastructure) Goal04(Quality Education) Goal 08(Decent work and Economic Growth)	Design consultancy.

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3 TBME-802 (B)**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: MANAGEMENT INFORMATION SYSTEMS **Theory Min. Marks:17**

COURSE OBJECTIVE:

At the end of the course, it is expected that students are able to understand the usage of Information Systems in management. The students also would understand the activities that are undertaken in acquiring an Information System in an organization. Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organization.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Management Information System (MIS): Definition, Objectives and benefits, MIS as strategic N tool, obstacles and challenges for MIS, functional and cross functional systems, hierarchical view of CBIS, structured and unstructured decision, Operation and mgt support, Decision process and MIS, info system components and activities, Value chain and MIS support.	Classroom teaching ICT tools and Google classroom,
Unit – II	System concepts: types, definition, characteristics, feedback (Pull) and feed-forward (Push) control, system stress and entropy, computer as closed system, law of requisite variety, open and flexible (Adaptive) systems, work system model and comparison with input-process-output model, five views of work system: structure, performance, infrastructure, context and risk and their effect on product performance.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – III	Info concepts: define data, info, knowledge, intelligence and wisdom, Information characteristics and attributes, info measurement and probability, characteristics of human as info processor.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Planning and control Concepts: terminologies, difficulties in planning, system analysis and development plan-purpose and participants, info planning, (SDLC) system development life cycle for in house and licensed sw, system investigation, analysis of needs, design and implementation phases, training of Operational personnel, evaluation, Control and Maintenance of Information Systems.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	E-business components and interrelationship, Evolution of Enterprise Resource Planning (ERP) from MRP, Supply chain management (SCM) and Customer relationship management (CRM), Integrated data model, strategic and operationalissues in ERP, Business Process Re-Engineering (BPR), significance and functions, information technology and computer NW support to MIS.	Classroom teaching, ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

At the end of the course, you will be able to:

- Explain basic concepts for IT/IS management
- Discuss organizational, business and strategic issues surrounding IT/IS, and

- Analyze and evaluate uses of strategic IT/IS in practice.

Text Books:

- Business Process Reengineering Radhakrishnan Rand Balasuramanian S PHI Learning
- MIS Jaiswal M and Mittal M Oxford higher Edu India
- Management Information Systems A Concise Study Kelkar SA PHI Learning
- ERP Garg. V.K TMH
- MIS- text and cases Jawadekar WS TMH

Reference Books:

- Management Information Systems Davis and Olson TMH
- Management Information Systems Oz Cengage
- Information Systems: Foundation of E- Business Alter Stevenson Prentice-Hall, USA
- Business Process Re-Engineering Jayaraman TMH
- ERP Alex Leon TMH

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3 TBME-802 (C)**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: DESIGN OF HEAT EXCHANGER **Theory Min. Marks:17**

COURSE OBJECTIVE:

The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	This course is designed to introduce a basic study of the phenomena of heat and mass transfer, to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems and processes.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – II	Thermal & hydraulic design of commonly used heat exchangers: LMTD & NTU Methods, correction factors, Double pipe heat exchangers , shell and tube heat exchangers, condensers , Evaporators ,Cooling and dehumidifying coils ,cooling towers, evaporative condensers ,design of air washers, desert coolers.	Classroom teaching ICT tools and Google classroom,
Unit – III	TEMA standard: Tubular heat exchangers TEMA standard heat-exchanger nomenclature, selection criteria for different types of shells and front and rear head ends; geometrical characteristics of TEMA heat exchangers.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Review of mechanical Design, Materials of Construction, corrosion damage, testing and inspection.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	Heat Pipe: Basics & its mathematical model, micro Heat Exchangers0, Use of Software in heat exchanger design.	Classroom teaching, ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

Upon successful completion of this course, the student will be able to:

- Understand the basic laws of heat transfer.
- Account for the consequence of heat transfer in thermal analyses of engineering systems.
- Understand the fundamentals of convective heat transfer process.
- Analyze heat exchanger performance by using the method of log mean temperature difference.
- Analyze heat exchanger performance by using the method of heatexchanger effectiveness.

Text Books:

- Heat and mass transfer Kumar DS SK Kataria and Sons Delhi.

- Fundamentals of engineering heat and mass transfer Sachdeva RC
- Heat Transfer Dutta Binay K PHI
- Heat transfer Holman JP TMH
- Heat and mass transfer R.S. Khurmi S. Chand

Reference Books:

- Heat and mass transfer Sukhatme SP nUniversity Press Hyderabad
- Heat transfer Kreith
- Engineering heat transfer Gupta & Prakash

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Engineer for power plant	Able to design various heat transfer device.	Goal-12(Responsible Consumptions and Production)	Maintenance and design work for heat transfer device

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KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3 TBME-802 (D)**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: TOTAL QUALITY L T P MANAGEMENT AND SQC **Theory Min. Marks:17**

COURSE OBJECTIVE:

To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management. To understand the statistical approach for Quality Control. To create an awareness about ISO certification process and need for the industries.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Evolution of total quality management, historical perspective, teamwork, TQM and ISO 9000; information technology and Business Process Re-engineering (BPR); TPM and quality awards; aids and barriers to quality mgt, creating vision and initiating transformation, establishing programs for education and self improvements, measurement of key indicators; quality mgt leader; cross functional teams and coordination, policy setting and review, flowchart of policy mgt and relation with daily mgt.	Classroom teaching ICT tools and Google classroom,
Unit – II	Process- definition, variation and feedback, funnel-marble experiment- rules of adjustment and its effects, quality- definition, goalpost and kaizen view, quality of design, conformance and performance; Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; Deming's theory of mgt, fourteen points and variance reduction; attributes enumerative and variables analytic studies.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – III	SQC-Control charts: basic discrete and continuous distributions, measures of central tendency, variability and shapes, sampling, size and central value theorem, control chart structure, process plotting and stability, study of out-of-control evidences, defect detection and prevention, use of control charts in evaluating past, present and future trends; attribute control charts, count and classification charts, construction and interpretation of p , np , c and u charts, PDSA cycle(plan, do, study, act), and R charts, and s charts, individual and moving range chart, trial control limits and out of control points.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – IV	Process diagnostics: Between and Within Group variations, periodic and persistent disturbances, control chart patterns-natural, level-shift, cycle, wild, multi-universe, relationship and other out of control patterns; diagnosing a process, brainstorming; cause-effect, Ishikava, interrelationship, systematic and matrix diagrams; change concepts and waste elimination	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit - V	Process improvement: Performance and technical specifications, attribute-process and variable-process capability studies; unstable and stable process capability studies and examples; attribute and variable improvement studies; Inspection: acceptance sampling(AS)- lot formation, single, double and multiple/sequential sampling plans, operating characteristic (OC) curve, producer and consumer risk, theoretical invalidation of AS, kp rule for stable and chaotic processes.	Classroom teaching, ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

After studying this course, students shall be able to:

- Understand the meaning of total quality management.
- Understand the meaning of quality and industrial applications of total quality control.
- Apply the various quality control tools.
- Get the knowledge about different quality standards and their applications.

Text Books:

- Total quality management D.R. Kiran Butterworth heinemaan
- Total quality management Rashmi urdhwareshe Pearson

Reference Books:

- Total quality management Paul johns THM
- Total quality managementR.K SinghPearson
- Total quality managementC.K Sharma PHI

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME 803**
Course: BE Mechanical **Theory Max. Marks: 50**
SUBJECT: CAD/CAM **Theory Min. Marks:17**

COURSE OBJECTIVE:

The general objectives of the course are to enable the students to-

- Understand the basic fundamentals of computer aided design and manufacturing.
- To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc.
- To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication.
- To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control.
- To learn the overall configuration and elements of computer integrated manufacturing systems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); Mfg as a system, productivity and wealth creation; production processes on volume-variety axes; importance of batch and job shop production; CIM definition and CIM wheel, evolution and benefits; CIM as a subset of Product Life Cycle (PLC) mgt; design for mfg (DFM) and concurrent engg; product design in conventional and CIM environment; terms like CAD, CAE, CAM, CAP, CAPP, CATD and CAQ.	Classroom teaching ICT tools and Google classroom,
Unit – II	Graphics and standards: Raster scan, coordinate systems for model (M/ WCS) user and display; database for graphic modeling; PDM, PIM, EDM; define EDM, features of EDM; basic transformations of geometry- translation, scaling, rotation and mirror; introduction to modeling software; need for CAD data standardization; developments in drawing data exchange formats; GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data- STEP and major area application protocols.	Classroom teaching, ICT Based and individual presentation and Google classroom,
Unit – III	Geometric Modeling: Its use in analysis and mfg; 2D and 3D line, surface and volume models; linear extrusion and rotational sweep; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, b-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, b-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire-frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping.	Classroom teaching ICT tools and Google classroom,
Unit – IV	Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; nC part programming; ISO standard for coding, preparatory functions(G)- motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; ISO codes for turning tools and holders; ATC, modular work holding and pallets; time and power estimation in milling, drilling and turning; adaptive control, sequence control and PLC; simple part programming examples.	Classroom teaching, ICT Based and individual presentation and Google classroom,

Unit - V	Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile mfg; Computer Aided Process Planning (CAPP), variant/ retrieval and generative approach	Classroom teaching, ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

- To introduce a computer aided inspection and manufacturing systems.
- To apply the principles of operation of automated shop floor control and manufacturing process.
- To reduce manual processing and linking computers to all the manufacturing machines.
- To analyze, design, and build manufacturing and automation systems.
- Implement group technology concepts in production to facilitate cellular and flexible manufacturing.
- While implementing these designs, students will continually hone their interpersonal skills, creative abilities and understanding of the design process.
- Develop automated process plans using variant and generative approaches.
- Take appropriate strategy to gradually migrate from conventional manufacturing to FMS and CIM.

LIST OF EXPERIMENTS (PLEASE EXPAND IT):

1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs
3. Study of automatic and semi automatic control system and writing the electrical analogy.
4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations.
7. Robot and AGV programming

Text Books:

- CAD/CAM Rao PN TMH
- Computer Aided Manufacturing Rao PN TMH
- Principles of CIM S.Kant Vajpay PHI

Reference Books:

- Automation, Production Systems & CIM Groover MP P.H.I.
- Computer Integrated Mfg Alavudeen A, Venkteshwarn NPHI
- CAD/CAM/CIM Radhakrishnan P, Subramanian S andRaju V New age Pub

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME 804**
Course: BE Mechanical **Theory Max. Marks:50**
SUBJECT: INDUSTRIAL ROBOTICS **Theory Min. Marks:17**

COURSE OBJECTIVE:

- To acquire the knowledge of basics of robotics and their importance.
- Understand fundamental theory of robot design.
- To acquire the knowledge on advanced algebraic tools for the description of motion.
- To develop the ability to analyze and design the motion for articulated systems.
- To acquire the knowledge of sensors, actuators and vision system used in robotics.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Robotics Evolution of Robots and Robotics, Laws of Robotics, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,
Unit – II	Coordinate Frames, Mapping and Transforms Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices	Classroom teaching ICT tools and Google classroom,
Unit – III	Symbolic Modeling of Robots – Direct Kinematic Model Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator, Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transormation Matrix. Introduction to Inverse Kinematic model	Classroom teaching ICT tools and Google classroom,
Unit – IV	Robotic Sensors and Vision The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.	Classroom teaching ICT tools and Google classroom,
Unit - V	Robot Applications Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Principles for Robot Application and Application Planning, Justification of Robots, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.	Classroom teaching, practical example ICT Based and individual presentation and Google classroom,

COURSE OUTCOME:

- Apply knowledge of robotics for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development robots
- Demonstrate creativeness in designing and development of robotics.
- Identify, analyze and design of robots useful to the society.
- Work effectively with multidisciplinary robots

List of Experiments
As per suggested by the course coordinator

Text Books:

- Robotics and industrial automation R.K. Rajput S. Chand
- Industrial automation and roboticsA.K. Gupta TMH
- Introduction to robotics analysisSaeed B. Niku Wiley

Reference Books:

- Industrial automation and robotics S.K. Arora TMH
- Industrial robotics Keith dinwidddie Cengage Delmar learning

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Service Engineer, Power plant Manger	Able to understand and manage how to produce power in various power section and Understanding of how to develop power.	Goal04(Quality education) Goal08(Decent work and economic growth).	Can start own manufacturing units or a Service Consultancy

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME 805**
Course: BE Mechanical **Theory Max. Marks:100**
SUBJECT: MAJOR PROJECT **Theory Min. Marks:50**

COURSE OBJECTIVE:

- To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
- To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
- To give students an opportunity to do something creative and to assimilate real life work situation in institution.
- To adapt students for latest development and to handle independently new situations.
- To develop good expressions power and presentation abilities in students.

Syllabus:

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any) Working schedule The faculty and student should work according to following schedule:

Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

Action plan for Major Project work and its evaluation scheme #(Suggestive) Task/Process Week Evaluation Marks For Lab Workl# Orientation of students by HOD/Project Guide 1st - Literature survey and resource collection 2nd - Selection and finalization of topic before a committee* 3rd Seminar-I 10 Detailing and preparation of Project (Modeling, Analysis and Design of Project work 4th to 5th 10 Development stage Testing, improvements, quality control of project 6th to 10th 11th - 25 Acceptance testing 12th - 10 Report Writing 13th to 15th – 15 Presentation before a committee (including user manual, if any) 16th -

Seminar-II
30 * Committee comprises of HOD, all project supervisions including external guide from industry (if any)
The above marking scheme is suggestive, it can be changed to alternative scheme depending on the type of project, but the alternative scheme should be prepared in advance while finalizing the topic of project before a committee and explained to the concerned student as well.

NOTE: At every stage of action plan, students must submit a write up to the concerned guide:

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.

DR. C.V.RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR (C.G.)

SEMESTER- 8th **Subject Code: 3TBME 806**
Course: BE Mechanical **Theory Max. Marks:**
SUBJECT: EDUCATIONAL TOUR/ SEMINAR **Theory Min. Marks**

COURSE OBJECTIVE:

Course Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.

Job Opportunities	Employability Skill developed	UNDP Goal Achieved	Entrepreneurship Opportunity
Production Engineer, Machine Design analyst.	Ability to developed the various machining operation.	Goal-12(Responsible Consumptions and Production)	Popular technical skills are developed to start fabrication workshop.