Total No. of Questions : 05] [SET-A] [Total No. of Printed Page : 02

FINAL EXAMINATION – JULY 2017
MASTER OF SCIENCE (M.Sc. MATHEMATICS)
Final Year – Fourth Semester
Integral Transform – II

4M.Sc. 2

Time : 3 Hours **Max Marks : 70**
Min. Marks : 25

Note :- **Solve any two parts from each question. All questions carry Equal marks.**

Q.1. (a) Use finite Fourier transform to solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ given that u (o,t) = 0, u (π,t) = 0, u (x,o) = 2x, where o<x< π, t >o.

(b) Solve $\frac{\partial u}{\partial t} = 2\frac{\partial^2 u}{\partial x^2}$
If u (o,t) = 0, u (x,o) = e^{-x}, u (x,t) is bounded.

(c) Define the choice of infinite sine or cosine transforms.

Q.2. (a) State and prove Hankel transform of the derivatives of a function.

(b) To find the Hankel transform of $\frac{d^2 f}{dx^2} + \frac{1}{x}.\frac{df}{dx} - \frac{n^2}{x^2}$ f .

(c) Find the Hankel transform of :

$$F(x) = \begin{cases} 1 & 0 < x < a, \quad n = 0 \\ 0 & x > a, \quad n = 0 \end{cases}$$

Q.3. (a) State and prove Parseval's theorem of Hankel transform.

(b) Find the Hankel transform of order zero of the function $\frac{d^2 f}{dx^2} + \frac{1}{x}.\frac{df}{dx}$, where f ($x$) = $\frac{e^{-ax}}{x}$

(c) Prove that :
H $\left[\sum_{i=1}^{3} f_i(x)\right] = \sum_{i=1}^{3} H[f_i(x)]$

Q.4. (a) Find finite Hankel transform of $\frac{df}{dx}$.

Total No. of Questions : 05] [SET-A] [Total No. of Printed Page : 02

FINAL EXAMINATION – JULY 2017
MASTER OF SCIENCE (M.Sc. MATHEMATICS)
Final Year – Fourth Semester
Integral Transform – II

4M.Sc. 2

Time : 3 Hours **Max Marks : 70**
Min. Marks : 25

Note :- **Solve any two parts from each question. All questions carry Equal marks.**

Q.1. (a) Use finite Fourier transform to solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ given that u (o,t) = 0, u (π,t) = 0, u (x,o) = 2x, where o<x< π, t >o.

(b) Solve $\frac{\partial u}{\partial t} = 2\frac{\partial^2 u}{\partial x^2}$
If u (o,t) = 0, u (x,o) = e^{-x}, u (x,t) is bounded.

(c) Define the choice of infinite sine or cosine transforms.

Q.2. (a) State and prove Hankel transform of the derivatives of a function.

(b) To find the Hankel transform of $\frac{d^2 f}{dx^2} + \frac{1}{x}.\frac{df}{dx} - \frac{n^2}{x^2}$ f .

(c) Find the Hankel transform of :

$$F(x) = \begin{cases} 1 & 0 < x < a, \quad n = 0 \\ 0 & x > a, \quad n = 0 \end{cases}$$

Q.3. (a) State and prove Parseval's theorem of Hankel transform.

(b) Find the Hankel transform of order zero of the function $\frac{d^2 f}{dx^2} + \frac{1}{x}.\frac{df}{dx}$, where f ($x$) = $\frac{e^{-ax}}{x}$

(c) Prove that :
H $\left[\sum_{i=1}^{3} f_i(x)\right] = \sum_{i=1}^{3} H[f_i(x)]$

Q.4. (a) Find finite Hankel transform of $\frac{df}{dx}$.

1

(b) To find Hankel transform of
$\frac{d^2f}{dx^2} + \frac{1}{x}\frac{df}{dx}$, Where s is a root of equation J_n(as) = 0.

(c) Find finite Hankel transform of $x^{n-1}, (n > 1)$
if $x\,J_{n-1}$ (Six) is the Kernel of the transform.

Q.5. (a) To find finite the Hankel transform of
$\frac{d^2f}{dx^2} + \frac{1}{x}.\frac{df}{dx} - \frac{n^2}{x^2}$ f (r), Where s is the root 8 the equation
J_n(as) = 0.

(b) State and prove Convolution theorem of Mellin transform.

(c) State and prove Integral theorem of Mellin transform.

------x------

(b) To find Hankel transform of
$\frac{d^2f}{dx^2} + \frac{1}{x}\frac{df}{dx}$, Where s is a root of equation J_n(as) = 0.

(c) Find finite Hankel transform of $x^{n-1}, (n > 1)$
if $x\,J_{n-1}$ (Six) is the Kernel of the transform.

Q.5. (a) To find finite the Hankel transform of
$\frac{d^2f}{dx^2} + \frac{1}{x}.\frac{df}{dx} - \frac{n^2}{x^2}$ f (r), Where s is the root 8 the equation
J_n(as) = 0.

(b) State and prove Convolution theorem of Mellin transform.

(c) State and prove Integral theorem of Mellin transform.

------x------