Course Code: 3MSCM3
Course: Special Functions-I
Credit: 4
Last Submission Date: April 30 (for January Session)
October 31, (for July session)

Max. Marks:-70
Min. Marks:-25

Note:-attempt all questions.

Que.1 Prove that $\Gamma(z) = \lim_{n\to\infty} \int_0^n \left(1 - \frac{t}{n}\right)^n t^{z-1}\, dt$

Que.2 State & prove Gauss multiplication theorem.

Que.3 Prove that if $R_e(c-a-b) > o$ & $R_e(c) > R_e(b) > o$ and c is neither zero nor a negative integer then

$$F(a, b, ; c, 1) = \frac{\Gamma c \ \Gamma c-a-b}{\Gamma c-a \Gamma c-b}$$

Que.4 The complete elliptic integral of first kind being

$K = \int_0^{1/2\pi} \frac{d\emptyset}{\sqrt{1-k^2 \sin^2 \emptyset}}$ .Show that $k = \frac{1}{2}\pi F(\frac{1}{2}, \frac{1}{2}; 1; k^2)$

Que.5 State & prove Whipple's theorem.

Que.6 State & prove Saalschut'z theorem.

Que.7 State & prove Kummer's theorem.

Que.8 State & prove Ramanujan's theorem.

Que.9 Prove that

(1) $\frac{d}{dz}[z^n J_n(z)] = z^n J_{n-1}(z)$
(2) $z J_n'(z) = z J_{n-1}(Z) - n J_n(z)$

Que.10 Prove that

$$J_{\frac{3}{2}}(x) = \sqrt{\left(\frac{2}{\Pi x}\right)}\ \left[\frac{1}{x} \sin x - \cos x\right]$$