Code: 15A54201

R15

B.Tech I Year II Semester (R15) Regular & Supplementary Examinations May 2018

MATHEMATICS – II

(Common to all)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Find the Laplace transform of $\cos^2 t$.

(b) Find the inverse Laplace transform of $\frac{s}{s^2+s+13}$.

(c) Find the half range sine series for the function $f(t) = t - t^2$, $0 < t < 1$.

(d) Obtain the Fourier series for $f(x) = x$ in the interval (0, 2).

(e) State convolution theorem of the inverse transforms.

(f) Find the Fourier transformation of e^{-x^2}.

(g) Solve $py^3 + qx^2 = 0$ by method of separation of variables.

(h) Form the partial differential equation by eliminating the arbitrary constants: $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$.

(i) Find the Z-transformation of (na^n).

(j) Find the inverse Z-transformation of $\frac{1}{z-2}$.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Find the Laplace transform of the function $f(t) = \begin{cases} E\, \sin\omega t, & 0 < t < \pi/\omega \\ 0, & \frac{\pi}{\omega} < t < 2\pi/w \end{cases}$ having period $2\pi/\omega$.

(b) Find the Laplace transform of $\frac{1}{t}(e^{at} - e^{bt})$.

OR

3 Solve by Laplace transform method. $y'' - 3y' + 2y = 4, where\ y(0) = 2;\ y'(0) = 3$.

UNIT – II

4 (a) Find the Fourier series to represent $(x - x^2)$ from $x = -\pi$ to $x = \pi$.

(b) Find the half range cosine series for the function $f(x) = x^2$ in the range $0 \le x \le \pi$

OR

5 (a) Find the complex form of the Fourier series of $f(x) = e^{-x}$ in $-1 \le x \le 1$.

(b) Expand $f(x) = \begin{cases} \frac{1}{4} - x, & if\ 0 < x < \frac{1}{2} \\ x - \frac{3}{4}, & if\ \frac{1}{2} < x < 1 \end{cases}$ as the Fourier series of sin terms.

UNIT – III

6 Find the Fourier transform of $f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & |x > 1| \end{cases}$ Hence deduce that $\int_0^\infty \frac{sinx}{x} dx$.

OR

7 Find the Fourier transformation of $e^{-a^2x^2},\ a>0$

Contd. in page 2

UNIT – IV

8 (a) Form the partial differential equation by eliminating the arbitrary functions f(x^2+y^2, z-xy) = 0.

(b) The ends A and B of a rod 20 cm long have the temperature at 30°C and 80°C until steady state prevails. The temperature of the ends is changed to 40°C and 60°C respectably. Find the temperature distribution in the rod at time t.

OR

9 (a) Find the partial differential equation by eliminating the arbitrary constants from:

$$(x-a)^2+(y-b)^2+z^2=c^2.$$

(b) A tightly stretched string of length 1 with fixed ends is initially in equilibrium position, it is set vibrating by giving each point a velocity $v_0 sin^3\left(\frac{\pi x}{l}\right)$.

UNIT – V

10 (a) Evaluate Z-transformation of $\frac{z^2}{(z-1)(z-3)}$ using convolution theorem.

(b) Using Z-transforms solve, $y_n+\frac{1}{4}y_{n-1}=u_n+\frac{1}{3}u_{n-1}$ where u_n is a unit step sequence?

OR

11 (a) Evaluate Z-transformation of $\frac{z^3}{(z-1)^3}$ using convolution theorem.

(b) Using Z-transforms solve, $U_{n+2}-2U_{n+1}+U_n=3n+5$.

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