Code: 15A54201

R15

B.Tech I Year II Semester (R15) Supplementary Examinations December 2018

MATHEMATICS – II

(Common to all branches)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

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

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

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

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

(d) Obtain the Fourier series for f(x) = x^2 in the interval (-1, 1).

(e) State convolution theorem of the inverse transform.

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

(g) Solve $p^2 - q^2 = x-y$.

(h) Solve $q^2 = z^2p^2(1-p^2)$.

(i) Find $Z^{-1}(\frac{1}{z-2})$

(j) Find Z transform of n^3.

PART – B

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

UNIT – I

2 (a) Apply convolution theorem, evaluate $L^{-1}\left(\frac{1}{(s+a)(s+b)}\right)$.

(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 the function f(x) = $|x|$ from x = $-\pi$ to x = π.

(b) Find the half range Sin 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 $f(x) = \begin{cases} 1 - x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$ hence deduce that $\int_0^\infty \frac{\sin x}{x} dx$.

OR

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

UNIT – IV

8 (a) Form the partial differential equation $z = f_1(y + 2x) + f_2(y - 3x)$ by eliminating the arbitrary function.

(b) Use the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$.

OR

9 (a) From the partial differential equation by eliminating the arbitrary function $(x-a)^2 + (y-b)^2 + z^2 = c^2$

(b) Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the conditions $(0,y) = u(1,y) = u(x,0) = 0$ and $u(x,a) = \sin\left(\frac{n\pi x}{l}\right)$.

Contd. in page 2

UNIT – V

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

(b) Using Z-transforms, $y_n + \frac{1}{4}y_{n-1} = u_n + \frac{1}{3}u_{n-1}$ 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) Solve the differential equation $u_{n+2} - 2u_{n+1} + u_n = 3n + 5$ using Z-transforms.

*****