Code: 15A54201

R15

B.Tech I Year II Semester (R15) Supplementary Examinations December 2016

MATHEMATICS – II

(Common to all)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

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

(a) Write the conditions for existence of Laplace transform of a function.
(b) Define Unit Impulse function.
(c) Write Dirichlet conditions for Fourier series.
(d) Write the Parseval's formula for Fourier series.
(e) Write the complex form of Fourier integral.
(f) Write any two properties of Fourier transform.
(g) What are the assumptions to be made for one dimensional wave equation?
(h) What do you mean by steady state and transient state?
(i) Find the Z-transform of $\frac{1}{\lfloor n}$.
(j) Find $Z^{-1}\left\{\frac{z^2-2z}{(z-1)^2}\right\}$.

PART – B

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

UNIT – I

2 (a) Find the Laplace transform of $f(t)=|t-1|+|t+1|, t\ge 0$.

(b) Use Laplace transform to evaluate $L\left\{\int_0^\infty \frac{e^{-t}\sin t}{t}dt\right\}$.

OR

3 (a) Apply Convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$.

(b) Solve $ty''+2y'+y=\cos t, y(0)=1$.

UNIT – II

4 Find the Fourier series for $f(x)=1+x+x^2$ in $(-\pi,\pi)$. Hence deduce that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+.....=\frac{\pi^2}{6}$.

OR

5 (a) Expand $f(x)=\cos x, 0<x<\pi$ in a Fourier Sine series.

(b) Find the complex form of the Fourier series of $f(x)=e^{-x}$ in $[-1,1]$.

Contd. in page 2

UNIT – III

6 (a) Find Fourier cosine transform of e^{-x^2}.

(b) Find Fourier transform of $f(x)=\begin{cases}1-x^2, & |x|\le 1\\ 0 & ,|x|>1\end{cases}$.

OR

7 (a) Find Fourier sine transform of $\dfrac{e^{-ax}}{x}$.

(b) Find the Finite Fourier sine and cosine transform of $f(x)=2x, 0<x<4$.

UNIT – IV

8 (a) Form the partial differential equation by eliminating the arbitrary functions *f* and *g* from: $Z = f(2x+y)+g(3x-y)$.

(b) Solve by using the method of separation of variables the equation $2x\dfrac{\partial z}{\partial x}-3y\dfrac{\partial z}{\partial y}=0$.

OR

9 A rod of length 20 cm has its ends A and B kept at temperature $30℃ \text{ and } 90℃$ respectively until steady state conditions prevail. If the temperature at each end is then suddenly reduced to $0℃$ and maintained so, find the temperature distribution at a distance *x* from A at time *t*.

UNIT – V

10 (a) If $U(Z)=\dfrac{2z^2+5z+14}{(z-1)^4}$ then find U_2 and U_3.

(b) Use convolution theorem to evaluate $Z^{-1}\left\{\dfrac{z^2}{(z-a)(z-b)}\right\}$.

OR

11 Use Z-transform to solve: $y_{n+2}-2y_{n+1}+y_n=3n+5$.

*****