SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

I B.Tech II Semester (SVEC-16) Regular/Supplementary Examinations May - 2019

TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

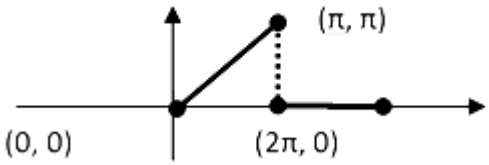
[Civil Engineering, Electrical and Electronics Engineering, Mechanical Engineering, Electronics and Communication Engineering, Computer Science and Engineering, Electronics and Instrumentation Engineering, Information Technology and Computer Science and Systems Engineering]

Time: 3 hours **Max. Marks: 70**

Answer One Question from each Unit.
All questions carry equal marks.

UNIT-I

1 Construct the periodic function for the graph in the interval $(0, 2\pi)$, and then express it as a Fourier series. 14 Marks



(OR)

2 Develop Fourier series expansion for the function $f(x) = \begin{cases} \pi x, & 0 < x < 1 \\ \pi(2 - x), & 1 < x < 2 \end{cases}$ 14 Marks

and hence evaluate $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} - - - -$.

UNIT-II

3 Using Fourier cosine transform of e^{-ax}, find the Fourier sine transform of xe^{-ax}. 14 Marks

(OR)

4 Solve the integral equation $\int_0^\infty f(x)\cos px\,dx = \begin{cases} 1 - p; & 0 \le p \le 1 \\ 0; & p > 1 \end{cases}$ and hence 14 Marks

evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt$.

UNIT-III

5 Solve, by using Laplace transforms method, $y''+4y = e^{-t}$, $y(0) = 2$, $y'(0) = 1$. 14 Marks

(OR)

6 Find the general solution to $y'' + 9y = \cos 2t$ by Laplace transform method. 14 Marks

UNIT-IV

7 i) Evaluate $Z(\sin h\, n\theta)$ 14 Marks
ii) Determine Z-transform of unit step sequence.

(OR)

8 Find the response of the system $y_{n+2} - 5y_{n+1} + 6y_n = u_n$, $y_0 = 0$, $y_1 = 1$ and $u_n = 1$ for $n = 0, 1, 2 \ldots$ by z-transform. 14 Marks

UNIT-V

9 Solve the differential equation $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ for which $\frac{\partial z}{\partial y} = -2\sin y$, when x=0 and z=0, when y is an odd multiple of π/2. 14 Marks

(OR)

10 A homogeneous rod of conducting material of length 100cm as its ends kept at zero temperature and the temperature initially is 14 Marks

$$u(x,0) = \begin{cases} x & 0 \le x \le 50 \\ 100 - x & 50 \le x \le 100 \end{cases}.$$

Find the temperature u(x, t) at any time t.

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