SREE VIDYANIKETHAN ENGINEERING COLLEGE
(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)
I B.Tech II Semester (SVEC-16) Regular/Supplementary Examinations June - 2018
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, 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　Obtain half range cosine series for $f(x) = x \sin x$ in $(0, \pi)$.　　　14 Marks

(OR)

2　Expand $f(x) = 2x - x^2$ in a Fourier cosine series in the interval $0 < x < 4$.　　　14 Marks

UNIT-II

3　Find the Fourier cosine and sine transform of $f(x) = \begin{cases} 1; & 0 < x < a \\ 0; & x \geq a \end{cases}$.　　　14 Marks

(OR)

4　a)　If the finite Fourier sine transform of $f(x)$ is $\dfrac{16(-1)^{n-1}}{n^3}$, then find $f(x)$ in $(0, \pi)$.　　　8 Marks

　　b)　If the finite Fourier cosine transform of $f(x)$ is $\dfrac{1 - \cos n\pi}{n^2 \pi^2}$, then find $f(x)$ in $[0, \pi]$.　　　6 Marks

UNIT-III

5　Evaluate:　　i) $L^{-1}\left\{ \ln\left(1 + \dfrac{1}{s}\right) \right\}$.　　　ii) $L^{-1}\left\{ \dfrac{1}{s^3 (s^2 + 1)} \right\}$.　　　14 Marks

(OR)

6　Solve $y'' + 4y' + 3y = e^t$ with $y(0) = 0$, $y'(0) = 2$ by transform method.　　　14 Marks

UNIT-IV

7　a)　Define z − transform of $f(n)$ and from the definition, find the Z-transform of $\left(\dfrac{1}{2}\right)^n + \left(\dfrac{1}{3}\right)^n$.　　　7 Marks

　　b)　Show that $Z(\sin h\, n\theta) = \dfrac{z \sin h\theta}{z^2 - 2z \cos h\theta + 1}$.　　　7 Marks

(OR)

8　Using Z-transform, solve $u_{n+2} - 3u_{n+1} + 2u_n = 0$, with $u(0) = 0$ and $u(1) = 1$.　　　14 Marks

UNIT-V

9　a)　Solve the linear differential equation $(x^2 - yz) p + (y^2 - zx) q = z^2 - xy$.　　　7 Marks

　　b)　Solve the equation $x^2 \dfrac{\partial u}{\partial x} + y^2 \dfrac{\partial u}{\partial y} = 0$ by applying method of separation of variables.　　　7 Marks

(OR)

10　A string is stretched and fastened to two points l apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at time $t = 0$. Find the displacement of any point on the string at a distance of x from one end at a time t.　　　14 Marks

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