

12. a) String is stretched and fastened to two end points l apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at a time $t = 0$. Find the displacement of any point of the string at a distance x from one end at anytime t . 16,K3,CO2

OR

- b) A rectangular plate with insulated surface is 20cm wide and so long compared to its width that it may be considered infinite in length without introducing appreciable error. the temperature at short edge $x = 0$ is given by $u(y) = \begin{cases} 10y, & 0 \leq y \leq 10 \\ 10(20 - y), & 10 \leq y \leq 20 \end{cases}$ and all other three edges are kept at 0°C . Find the steady state temperature at any point in the plate. 16,K3,CO2

13. a) Find the complex Fourier transform of $f(x) = \begin{cases} 1 - x^2, & |x| < 1 \\ 0, & |x| \geq 1 \end{cases}$ and hence evaluate $\int_0^\infty \left(\frac{x \cos x - \sin x}{x^3} \right) dx$. 16,K3,CO3

OR

- b) Evaluate $\int_0^\infty \frac{x^2}{(a^2+x^2)(b^2+x^2)} dx$. 16,K3,CO3

14. a) The number of accidents in a year attributed to taxi drivers in a city follows a Poisson distribution with mean equal to 3. Out of 1000 taxi drivers, find approximately the number of drivers with (i) no accident in a year, (ii) more than 3 accidents in a year. 16,K3,CO4

OR

- b) A random variable X has the following probability function : 16,K3,CO4

Value of x	0	1	2	3	4	5	6	7
$P(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

- (i) Find k ,
 (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$,
 (iii) Find the minimum value of a such that $P(X \leq a) > \frac{1}{2}$,
 (iv) (Determine the distribution function of X).

15. a) The joint pdf of a two dimensional random variable (X, Y) is given by $f(x, y) = xy^2 + \frac{x^2}{8}$, $0 \leq x \leq 2$; $0 \leq y \leq 1$. Compute (1) $P[X > 1]$ (2) $P\left[Y < \frac{1}{2}\right]$ (3) $P\left[X > 1 / Y < \frac{1}{2}\right]$ (4) $P[X + Y \leq 1]$. 16,K3,CO5

OR

- b) Find the correlation co-efficient for the following data 16,K3,CO5

X	10	14	18	22	26	30
Y	18	12	24	6	30	36