C.S.E

Roll No. ....
Printed Pages : 3

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BT-3 / D-17
MATHEMATICS-III
Paper–AS-201 N

Time allowed : 3 hours]   *[Maximum marks : 75*

Note :   *Attempt any five questions selecting at least one from each unit. All questions carry equal marks.*

Unit–I

1. (a) Find the Fourier series for the function $f(x) = x^3$ in $(-\pi, \pi)$.

   (b) Find the half–range cosine series of $f(x) = \sin\left(\dfrac{nx}{\ell}\right)$ in $0 < x < \ell$.

2. (a) Find the Fourier sine Transform of $\dfrac{e^{-ax}}{x}$.

   (b) Using Parseval's identity, show that

   $$\int_0^\infty \frac{t^2}{\left(4+t^2\right)\left(9+t^2\right)}dt = \frac{\pi}{10}.$$

Unit–II

3. (a) Solve the equation $(y+z)p + (z+x)q = x+y$, where p and q have their usual meaning.

   (b) Solve the PDE $\dfrac{\partial^2 z}{\partial x^2} + \dfrac{\partial^2 z}{\partial x \partial y} - 2\dfrac{\partial^2 z}{\partial y^2} = \sqrt{2x+y}$

33102   [Turn over

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4. Solve the following LPP by Simplex method

   Minimize $Z = x_1 - 3x_2 + 3x_3$

   Subject to $3x_1 - x_2 + 2x_3 \le 7$; $2x_1 + 4x_2 \ge -12$; $-4x_1 + 3x_2 + 8x_3 \le 10$; $x_1, x_2, x_3 \ge 0$

Unit–III

5. (a) If $\cosh x = \sec\theta$, prove that $x = \log\left[\tan\left(\dfrac{\pi}{4} - \dfrac{0}{2}\right)\right]$

   (b) If $(a+ib)^p = m^{x+iy}$, Prove that $\dfrac{y}{x} = \dfrac{2\tan^{-1}\left(\dfrac{b}{a}\right)}{\log\left(a^2 + b^2\right)}$.

6. (a) Evaluate $\displaystyle\int_{1-i}^{2+3i} \left(z^2 + z\right) dz$ along the line joining the points $(1, -1)$ and $(2, 3)$.

   (b) Evaluate, using Cauchy's Integral formula: $\displaystyle\int_C \dfrac{e^{2z}}{(z+1)^4}dz$

   where C is the circle $|Z| = 2$.

Unit–IV

7. (a) A committee consists of 9 students two of which are from 1st year, three from 2nd year and four from 3rd year. Three students are to be removed at random. What is the chance that two belongs to the same class and third to the different class?

33102

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(b) Five balls are drawn from a bag containing 6 white and 4 black balls. What is the change that 3 white and 2 black balls are drawn?

8. (a) Four coins are tossed. What is the expectation of the number of heads?

(b) A product is 0.5% defective and is packed in cartons of 100. What percentage contains not more than 3 defectives?

33102