

3E1418

Roll No. : _____

Total Printed Pages : **3****3E1418****B. Tech. (Sem. III) (Main/Back) Examination, January-2012**
3AE6/ME6 Advanced Engineering MathematicsTime : **3 Hours**][Total Marks : **80**
[Min. Passing Marks : **24****Instructions to Candidates :**

Attempt any **five questions** selecting **one question** from each unit. All questions carry **equal marks**. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. _____ Nil _____ 2. _____ Nil _____

UNIT - I1 (a) Find the Fourier series for $f(x) = x^2$ in the interval $(-\pi, \pi)$.

(b) Find the Laplace inverse of the following :

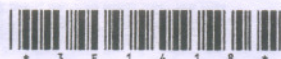
$$\frac{4}{s-2} - \frac{3s}{s^2+16} + \frac{5}{s^2+4}$$

OR1 (a) Find Fourier sine transform of $f(x)$:

$$f(x) = \begin{cases} 1 & \text{for, } 0 < x < a \\ 0 & \text{for } x > a \end{cases}$$

(b) find $f(x)$ if its cosine transform is e^{-as}

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UNIT - II

2 Find Laplace of :

(a) $a + bt + ct^2$

(b) $e^{-4t} \cos h 2t$

OR

2 (a) Find inverse Laplace transform of the function $\frac{1}{s} \cos \frac{1}{s}$

(b) $L[\cos h at \cos at]$

UNIT - III

3 Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies Laplace equation and find corresponding analytic function.

OR

3 Expand $\frac{1}{z(z^2 - 3z + 2)}$ in Laurentz series for the region

(a) $0 < |z| < 1$

(b) $1 < |z| < 2$

UNIT - IV

4 (a) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by

$y = y_0 \sin^3 \frac{\pi x}{l}$. If is released from rest from this position.

Find the displacement $y(x, t)$.

(b) Prove that $x J_n'(x) = n J_n(x) - x J_{n+1}(x)$.

OR

4 (a) $x J_n'(x) = -n J_n(x) + x J_{n-1}(x)$

(b) $(2n+1)x P_n = (n+1)P_{n+1} + nP_{n-1}$.



UNIT - V

- 5 (a) The population of a town in the decimal census were as under. Estimate the population for the year 1925 :

Year	x	1891	1901	1911	1921	1931
Population (in thousands)	y	46	66	81	93	101

- (b) Find $\Delta^6(ax-1)(bx^2-1)(cx^3-1)$

OR

- 5 (a) Find $f(5)$ from the following table by using Lagrange's interpolation formula :

x	1	2	3	4	7
f(x)	2	4	8	16	128

- (b) Use Simpson $\frac{1}{3}$ rule to calculate the following :

$$\int_0^1 \frac{2x}{1+x^2} dx$$

