



C14-EC-401/C14-CHPC-401/C14-PCT-401

4455

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2016

DECE—FOURTH SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—III

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Solve the equation $\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 9x = 0$.

2. Solve $(D^4 - 16)y = 0$.

3. Find the particular integral for $(2D^2 - D - 6)y = e^{2x}$.

4. Find the Laplace transform of $\sin 8t \cos 4t$.

5. Define convolution of two functions and state the convolution theorem.

6. Find the inverse Laplace transform of $\frac{6}{(s^2 - 4)} + \frac{1}{s - 6} + \frac{1}{s^2}$.

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7. Find inverse Laplace transform of $\frac{s}{(s-2)^3}$.
8. Write the formulae for Fourier series of a function $f(x)$ in the interval $[C, C+2l]$.
9. Find the Fourier coefficient a_0 for $f(x) = (l-x)^2$ in $(-l, l)$.
10. An integer is picked from 1 to 20 numbers, both inclusive. Find the probability that it is a prime.

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Solve $(D^2 - 2D - 8)y = e^{3x} - e^{4x}$.

(b) Solve $(D^2 - 8D - 9)y = \sin 3x$.

12. (a) Solve $(D^2 - 4D - 4)y = x^3$.

(b) Solve $(D^3 - 4D)y = \cos 2x - x$.

13. (a) Find Laplace transform of $\frac{1 - \cos t}{t}$.

(b) Evaluate $\int_0^{\infty} t e^{-2t} \sin 3t dt$, using Laplace transform.

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14. (a) Find $L^{-1} \frac{s-2}{s^2-4s-13}$.

(b) Find $L^{-1} \frac{1}{s^2(s^2-a^2)}$ using convolution theorem.

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15. Find Fourier series for the function $f(x) = x - x^2$ in $(-2, 2)$.

16. (a) Expand $f(x) = x^3$ as Fourier series in x .

(b) Find the half range sine series for

$$f(x) = \begin{cases} x & \text{for } 0 < x < \frac{\pi}{2} \\ x & \text{for } \frac{\pi}{2} < x < \pi \end{cases}$$

17. (a) When two dice are thrown simultaneously, find the probability of getting a sum an even number.

(b) Find the probability of drawing an ace or a spade or both of them from a deck of cards.

18. (a) Let A and B are independent events with $P(A) = \frac{3}{5}$ and $P(B) = \frac{2}{5}$

and $P(A \cap B) = \frac{1}{4}$. Find (i) $P(A \cup B)$, (ii) $P(A^c)$ and $P(B^c)$, (iii) $P(A^c \cap B^c)$ and (iv) $P(B / A)$.

(b) State the addition and multiplication theorems of probability and explain conditional probability of two events.

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