



C14-IT-401/ C14-C-401/C14-CM-401

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BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2016 DCE—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 $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} - 8y = 0$.

2. Solve $(D^4 - 18D^2 - 81)y = 0$.

3. Find the particular integral for $(D^2 - 9)y = \cos 3x + e^{3x}$.

4. State the first shifting and second shifting theorems of Laplace transforms.

5. Find the Laplace transform of $4e^{2t} - 6t^3 + 2\cos 5t$.

6. Find the inverse Laplace transform of $\frac{4s - 5}{(s - 1)^4}$.

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7. Find the inverse Laplace transform of $\frac{1}{s(s^2 - 4)}$.
8. Write the Euler's formulae for Fourier series of a function $f(x)$ in the interval $[C, C + 2\pi]$.
9. Find the half range Fourier sine series of $f(x) = K$ in $(0, \pi)$ for any constant K .
10. State addition and multiplication theorems of probability for two events.

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 $(D^2 - D - 6)y = e^{2x}$.
 (b) Solve $(D^3 - 4D)y = 5 \sin 2x$.
12. (a) Solve $(D^2 - 2D - 1)y = x^3$.
 (b) Solve $(D^4 - 81)y = \cos 3x + \sinh 3x$.
13. (a) Find the Laplace transform of $t \sin 2t \cos t$.
 (b) Find the Laplace transform of $\int_0^t \frac{e^t \sin t}{t} dt$.
14. (a) Find $L^{-1} \frac{20 - 4s}{s^2 - 4s - 20}$.
 (b) Find $L^{-1} \frac{s}{(s^2 - 1)^2}$ using convolution theorem.

15. Find ^{*}Fourier series for the function in $(-\pi, \pi)$, where
- $$f(x) = \begin{cases} x & \text{for } 0 < x < \pi \\ 0 & \text{for } -\pi < x < 0 \end{cases}$$
16. (a) Expand $f(x) = |x|$ as Fourier series in $(-\pi, \pi)$.
 (b) Find the half range cosine series for $f(x) = x$ in $(0, \pi)$.
17. (a) When two dice are thrown simultaneously, find the probability of getting a sum of 8.
 (b) In a hostel 60% students read Telugu newspaper, 40% students read English newspaper and 20% read both the papers. A student is selected at random, find the probability that the student reads neither Telugu for English newspaper.
18. (a) Let A and B are independent events with $P(A) = \frac{1}{2}$ and $P(B) = \frac{1}{3}$. Find (i) $P(A \cap B)$, (ii) $P(A \cup B)$, (iii) $P(A | B)$ and (iv) $P(B | A)$.
 (b) Box-I contains 8 white and 2 black balls, Box-II contains 5 white, 5 black balls and Box-III contains 4 white and 6 black balls. A box is selected at random and a ball is drawn from it, what is the probability that the ball is white?

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