



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

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—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 $(D^2 - 2D - 3)y = 0$.

2. Solve $(D^2 - 4D - 13)y = 0$.

3. Find the particular integral of $(D^2 - 1)y = x^2$.

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

5. Find $L(\sin^2 t)$.

6. Find $L(te^{-t})$.

7. Find the inverse Laplace transform of $\frac{s^2 - 4}{s^3}$.

8. Write down the Fourier series expansion of a function $f(x)$ in the interval $(c, c + 2\pi)$. Give the formulae for finding the Fourier coefficients.

- * 9. Calculate the coefficient a_0 in Fourier series expansion of $x \sin x$ in the interval $(-\pi, \pi)$.
10. State the addition theorem on probability. If A and B are mutually independent events such that $P(A) = 3/4$ and $P(B) = 3/5$, then find $P(A \cap B)$.

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 the differential equation $(D^2 - 6D + 9)y = e^{3x}$.
 (b) Find the particular integral of $(D^2 - 4D + 3)y = e^{2x} \cos x$.
12. (a) Find the particular integral of $(D^2 - D + 3)y = x \sin 2x$.
 (b) Solve $(D^2 - 9)y = x^4$.
13. (a) Find $L(t(\sin t + \cos t))$.
 (b) Using convolution theorem, find $L^{-1} \frac{1}{(s-1)(s-2)}$.
14. (a) Find the Laplace transform of $\frac{e^{2t} - e^{3t}}{t}$.
 (b) Find $L^{-1} \frac{s-1}{s^2 - 6s + 7}$.

- * 15. Obtain the Fourier series expansion of the function $f(x) = x^2$ in the interval $(-\pi, \pi)$. Hence, deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{2}{6}$.

16. Find the Fourier series expansion for $f(x) = \begin{cases} 2-x & \text{for } 0 < x < 1 \\ x & \text{for } 1 < x < 2 \end{cases}$

- * 17. (a) Four boys and four girls sit in a row at random. Find the probabilities that (i) the girls sit together and (ii) boys and girls sit alternately.
- (b) A given problem is solved by three students independently with probabilities 0.4, 0.5, 0.25. What is the probability that a given problem is solved?
18. (a) For any events A, B it is given that $P(A) = 2/3$, $P(B) = 3/4$ and $P(A \cap B) = 5/6$. Find $P(A/B)$ and $P(B/A)$.
- (b) In a game of dice, the player wins if sum of numbers on dice is 6 or 8. What is the probability of his winning if two dice are thrown at a time?
