



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

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BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL—2017
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.

1. Solve :

$$\frac{d^2y}{dx^2} + 6\frac{dy}{dx} - 4y = 0$$

2. Solve :

$$(D^3 - 5D^2 - 8D - 4)y = 0$$

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

4. Find the Laplace transform of $\sin 2t + \sin 3t$.

5. Find the Laplace transform of $t^3 e^{-3t}$.

6. Find $L^{-1} \left\{ \frac{s^2 - 3s + 4}{s^4} \right\}$.

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7. Find $L^{-1} \frac{1}{(s-a)^3}$.
8. Write down the formulae for finding Euler's constants of Fourier series in the interval $(0, 2\pi)$.
9. Find the value of a_2 in Fourier series expansion of $f(x) = x$ in $(0, 2\pi)$.
10. An urn contains 5 black, 7 red and 3 white balls. A ball is drawn at random. Find the probability that the ball drawn is 'red'.

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.
(2) Each question carries **ten** marks.

11. (a) Solve :
 $(D^2 - D - 12)y = e^{2x} + e^{3x}$
- (b) Solve :
 $(D^2 - 3D - 2)y = \cos 3x$
12. (a) Find the particular integral of $(D^2 - 5D - 6)y = \sin x + \sin 4x$.
- (b) Solve :
 $(D^2 - 3D - 2)y = x$
13. (a) Find $L\{(t-2)^2 e^t\}$.
- (b) Find $L \frac{\cos 2t - \cos 3t}{t}$.
14. (a) Find $L^{-1} \log \frac{s-3}{s-4}$.
- (b) Find $L^{-1} \frac{s-12}{s^2-4s}$.

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15. Expand the function $f(x) = x^2$ as a Fourier series in $(-\pi, \pi)$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots - \frac{1}{12^2} + \dots$$

16. Obtain the Fourier half-range cosine series and sine series for $f(x) = x$ in the interval $(0, \pi)$.

17. (a) An integer is chosen at random from the first 200 positive integers. What is the probability that the integer selected is divisible by 6 or 8?

- (b) A die is thrown. Let A be the event 'the number appearing is a multiple of 3' and B be the event 'the number appearing is even'. State whether A and B are independent. Support your statement.

18. (a) Let A and B be two events with $P(A) = \frac{3}{8}$, $P(B) = \frac{5}{8}$ and $P(A \cap B) = \frac{3}{4}$. Find $P(A|B)$.

- (b) Three machines A , B and C produce respectively 60%, 30% and 10% of the total number of items in a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C .

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