



C14-A-401/C14-AA-401/C14-AEI-401/  
C14-CH-401/C14-CHST-401/  
C14-MET-401/C14-MNG-401/

C14-TT-401/C14-BM-**401**  
**4401**

**BOARD DIPLOMA EXAMINATION, (C-14)**

**MARCH/APRIL—2016**

**FOURTH SEMESTER (COMMON) EXAMINATION**

**ENGINEERING MATHEMATICS—III**

*Time : 3 hours ]*

*[ Total Marks : 80*

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**PART—A**

3×10=30

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

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

1. Solve  $(D^2 - 11D - 30)y = 0$ .

2. Solve  $(D^3 - 3D^2 - 3D - 1)y = 0$ .

3. Find the particular integral of  $(D^2 - 4)y = x^2$ .

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

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

6. Find  $L(\cos 2t)$  by change of scale property assuming the formula for  $L(\cos t)$ .

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7. Find the inverse Laplace transform of  $\frac{2s-1}{s^2-4}$ .
8. State the conditions for the existence of Fourier series of a function in an interval.
9. Calculate the Fourier coefficient  $b_n$  in Fourier series expansion of the function  $f(x) = x$  in the interval  $(-\pi, \pi)$ .
10. State the multiplication theorem of probability. If  $P(A) = \frac{1}{4}$  and  $P(A \cap B) = \frac{1}{6}$ , find  $P(B/A)$  for any events  $A$  and  $B$ .

**PART—B**

10×5=50

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

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

11. (a) Solve the differential equation  $(D^2 - 2D - 1)y = e^x - e^{2x}$ .

(b) Find the particular integral of  $(D^2 - 9)y = \sin 2x \cos x$ .

12. Solve  $(D^2 - 4D - 4)y = e^{3x} \cos 2x - 3x$ .

13. (a) Find  $L(t(e^{-t} \sin t))$ .

(b) Find  $L^{-1} \frac{1}{s^2 - 5s - 4}$ .

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14. Solve the differential equation  $(D^2 - 2D - 2)y = 0$ , given that  $y(0) = 1$ ,  $y'(0) = 1$ , using the method of Laplace transforms.

15. Obtain the Fourier series expansion of the function  $f(x) = x - x^2$  in the interval  $(-\pi, \pi)$ .

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- 16.** Find the half-range sine series  $f(x) = x(1-x)$  in  $0 < x < 1$  and deduce that

$$\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \dots = \frac{3}{32}$$

- 17.** (a) Two cards are drawn from a pack of cards. Find the probability that both are either black or aces.
- (b) Letters of the word 'EQUATION' are arranged in a row at random. Find the probability that (i) all vowels are together and (ii) no two vowels are together.
- 18.** (a) Two dice are thrown at a time. What is the probability that the sum of the numbers appeared is greater than 9?
- (b) In a polytechnic, 25% of students failed in Mathematics, 20% failed in English and 15% failed in both subjects. If a student is selected at random, what is the probability that—
- (i) he failed in English given that he failed in Mathematics;
- (ii) he failed in Mathematics given that he failed in English.

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