



C16-A/AA/BM/CH/CHST/AEI/  
MNG/MET/TT/IT/PCT-102

6002

BOARD DIPLOMA EXAMINATION, (C-16)  
OCT/NOV—2018  
DPCT—FIRST YEAR (COMMON) EXAMINATION  
ENGINEERING MATHEMATICS-I

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. Resolve  $\frac{1}{(x-3)(x-2)}$  into partial fractions.

2. If  $A = \begin{pmatrix} 2 & 0 \\ 1 & 1 \end{pmatrix}$ , then find  $A^2 - 3A + 5I$

3. If  $A = \begin{pmatrix} 2 & 1 & 0 \\ 5 & 1 & 3 \end{pmatrix}$  and  $B = \begin{pmatrix} 0 & 1 & 1 \\ 3 & 2 & 5 \end{pmatrix}$ , find  $3A - 4B$ .

4. If  $\sin A = \frac{3}{5}$  and  $\cos B = \frac{5}{13}$ , then find  $\sin(A - B)$ .

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5. Show that  $\frac{\cos 7A}{\sec A} = \frac{\sin 7A}{\operatorname{cosec} A} = \cos 8A$
6. Find the conjugate of the complex number  $(1 - 4i)(4 - 3i)$ .
7. Find the perpendicular distance of the point  $(3, -5)$  from the line  $3x - 4y - 26 = 0$ .
8. Find the intercepts made by the straight line  $3x - 2y - 2 = 0$ .
9. Evaluate  $\lim_{\theta \rightarrow 0} \frac{\sin 3\theta}{\tan 7\theta}$
10. Find  $\frac{dy}{dx}$  if  $y = x \log x$ .

**PART—B**

10×5=50

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

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

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

11. (a) If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 3 & 0 \\ 0 & 2 & 1 \end{bmatrix}$ , then find  $\operatorname{Adj} A$ .

(b) Solve the following equations by using Cramer's Rule:

$$x - 2y + 3z = 6, 2x - 4y - z = 7 \text{ and } 3x - 2y - 3z = 8$$

12. (a) Show that  $\cos 3A \cos 5A \cos 9A \cos 17A = 4 \cos 4A \cos 6A \cos 7A$

(b) If  $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{\pi}{2}$  then show that  $x^2 + y^2 + z^2 = 2xyz$

13. (a) Solve  $\sin \theta = \sin 3\theta = \sin 5\theta = \sin 7\theta$ .

(b) In any  $\triangle ABC$ , show that  $a^3 \sin(B - C) = 0$

- \* 14. (a) Find the equation of the circle with (1,2) and (4,5) as the end points of a diameter. Also find the radius and center of the circle.
- (b) Find the equation of the rectangular hyperbola with focus (-1,1) and the directrix is the line  $x - y - 1 = 0$ .
15. (a) Find  $\frac{dy}{dx}$  if  $x^3 + y^3 - 2axy = 0$
- (b) If  $y = \sqrt{x \sqrt{x \sqrt{x \sqrt{x \dots \dots \dots \text{times}}}}}$ , find  $\frac{dy}{dx}$
16. (a)  $x = a \cos^3 \theta$ ,  $y = b \sin^2 \theta$ , find  $\frac{dy}{dx}$
- (b) If  $u = \sin^{-1} \frac{x^2 - y^2}{x + y}$ , prove that  $x \frac{du}{dx} - y \frac{du}{dy} = \tan u$
17. (a) Find the lengths of the tangent, normal, subtangent and subnormal to the curve  $x = a(\sin \theta)$ ,  $y = a(1 - \cos \theta)$  at  $\frac{\pi}{3}$
- (b) A circular metal plate expands by heat so that its radius increases at the rate of 0.02cm/sec. At what rate is the area increasing when the radius is 3 cm.
- \* 18. (a) Find the maximum and minimum values of  $4x^3 - 18x^2 + 24x - 7$
- (b) If an error of 2% is made in measuring the side of a square plate, find the corresponding percentage error in its area.

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