



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 $A = \begin{pmatrix} 1 & 2 & 2 \\ 1 & 3 & 0 \\ 0 & 2 & 1 \end{pmatrix}$, 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 $y = \sqrt{x} \sqrt{x} \sqrt{x} \sqrt{x} \dots \dots \dots$ 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 $\theta = \frac{\pi}{3}$

(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.
