



C09-CHPC-102/C09-EC-102/C09-PET-102

3028

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—2014

DECE—FIRST YEAR 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. Simplify $2[a - b \{3a - 4b - (3a - 2a - 6)\}]$.

2. Solve $x^3 - 6x^2 - 11x - 6 = 0$.

3. Resolve into partial fractions

$$\frac{6 - 5x}{(x - 2)(x - 1)}$$

4. Show that $\tan 3A - \tan 2A - \tan A = \tan 3A \tan 2A \tan A$.

5. If $\sin A = \frac{4}{5}$ and A is an acute angle, find $\sin 2A - \cos 2A$.

6. Find the modulus-amplitude form of $\sqrt{3} - i$.

7. Find the angle between the lines $2x - y - 3 = 0$, $x - y - 2 = 0$.

- * 8. Find the equation of the circle having the points (3, 4) (7, -2) as the end points of a diameter.

9. Evaluate :

$$\text{Lt}_0 \frac{1 - \cos x}{\sin x}$$

10. If $y = x \log x$, find $\frac{dy}{dx}$.

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

$$\begin{array}{r} x + y + z = 3 \\ x + 2y + 3z = 4 \\ x + 4y + 9z = 6 \end{array}$$

using Gauss-Jordan method.

- (b) Show that

$$\begin{vmatrix} 1 & a & 1 & 1 \\ 1 & 1 & a & 1 \\ 1 & 1 & 1 & a \end{vmatrix} = a^2(a - 3)$$

12. (a) If $A + B + C = 180$, prove that

$$\cos 2A + \cos 2B + \cos 2C = 1 - 4 \sin A \sin B \cos C$$

- (b) Solve $\tan^{-1}(1-x) + \tan^{-1}(1+x) = \tan^{-1}(\frac{1}{2})$.

13. (a) Solve $2 \cos^2 \theta - 11 \sin \theta + 7 = 0$.

- (b) Prove that

$$\frac{a^2 \sin(B - C)}{\sin A} = b^2 - c^2$$

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14. (a) Find the equation of the parabola given that its axis is parallel to x -axis and passing through the points $(-1, 2)$, $(2, 0)$, $(0, 4)$.

(b) Find the equation of the ellipse whose focus is $(4, 3)$, directrix is $x - y - 2 = 0$ and $e = 2/5$.

15. (a) Find the equation of the hyperbola with vertex $(3, 0)$, foci $(4, 0)$.

(b) Find the angle between the two lines whose dr's are $(1, -2, 1)$ and $(1, 1, 0)$.

16. (a) Find $\frac{dy}{dx}$, if $y = (x)^{\sin x}$.

(b) If $U = \log(x + y + z)$, prove that

$$x \frac{u}{x} + y \frac{u}{y} + z \frac{u}{z} = 1$$

17. (a) Find the angle between the curves $x^2 + y^2 = 8$ and $x^2 = 2y$.

(b) A particle is moving along a line according to the law $s = 2t^3 - 3t^2 + 15t + 18$ (t in second). Find its velocity when acceleration is zero.

18. (a) Find the maxima and minima of $2x^3 - 9x^2 + 12x + 15$.

(b) Radius of a spherical balloon is increased by 0.1%. Find the approximate percentage increase in its volume.

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