

3002
BOARD DIPLOMA EXAMINATION, (C-09)
JUNE- 2019
DIPLOMA IN AUTOMOBILE ENGINEERING
ENGINEERING MATHEMATICS - I (COMMON)
FIRST YEAR EXAMINATION

Time: 3 Hours

Total Marks: 80

PART - A (10 x 3 = 30 Marks)

Note 1: Answer all questions and each question carries 3 marks

2: Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. Express $4x^2 - 4x + 5$ in the form of sum/ difference of squares
2. If $x = a-b$, $y = b-c$, $z = c-a$, find the value of $2x-3y-4z$.
3. Resolve $\frac{1}{(x+1)(x+2)}$ into partial fractions
4. Show that $\frac{1-\cos 2\alpha}{\sin 2\alpha} = \tan \alpha$
5. Express $1+i\sqrt{3}$ in the modulus amplitude form.
6. Show that $\frac{\cos 29^\circ + \sin 29^\circ}{\cos 29^\circ - \sin 29^\circ} = \tan 74^\circ$
7. Find the intercepts made by the Straight line $13x + 7y + 11 = 0$ on the co-ordinate axis.
8. Find the Centre and Radius of the Circle $x^2 + y^2 - 6x + 4y + 12 = 0$.
9. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 47x}{\tan 11x}$
10. Differentiate $e^{3x} \cos 7x$ w.r.t x

PART - B (5 x 10 = 50 Marks)

Note 1: Answer any five questions and each question carries 10 marks

** 2: The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer*

11. a) If $A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}$, and $B = \begin{bmatrix} -3 & 2 \\ 1 & -5 \\ 4 & 3 \end{bmatrix}$ find AB .

b) Solve the Equations

$$x + y + 4z = 6$$

$$3x + 2y - 2z = 9$$

$$5x + y + 2z = 13 \text{ using Cramer's rule.}$$

12. a. Show that $\frac{\sin 17A + \sin 7A}{\cos 17A + \cos 7A} = \tan 12A$

b. Show that $\tan^{-1} \frac{2}{3} + \cot^{-1} \frac{4}{3} = \tan^{-1} \frac{17}{6}$

13. (a) Solve $4\sin^2\theta - 8\cos\theta + 1 = 0$
(b) Solve the ΔABC if $a = 2$, $A = 30^\circ$, $C = 30^\circ$
14. (a) Find the equation of the conic whose focus is at $(1, 2)$ and directrix $2x + y - 1 = 0$ with eccentricity $\sqrt{3}$.
(b) Find the centroid of the triangle formed by the points $(1, 1, 1)$, $(1, -1, 1)$ and $(-7, -3, -5)$.
15. (a) Find the equation of parabola whose focus is $(-1, 1)$ and directrix $x + y + 1 = 0$.
(b) Find the centre, vertices, eccentricity, foci, equations of directrices and lengths of latusrectum of the ellipses represented by the equation $4x^2 + 9y = 36$.
16. a) Differentiate $x^{\log x}$ w.r.t x .
b) If $x = a(1 - \cos t)$, $y = a(t - \sin t)$, find $\frac{dy}{dx}$
17. (a) Find the equations of the tangent and normal to the curve $y^2 - 2y = x$ at the point $(3, 3)$.
(b) Each side of a square increases at the rate of 1.5cm/sec . Find the rate at which the area of the square increases when the side is 12cm .
18. (a) Show that the semi vertical angles of cone of maximum volume and of given slant height is $\tan^{-1}(\sqrt{2})$.
(b) If an error of 0.02 cm is made in measuring the side 10cm of a square, find the approximate error made in calculating its area.

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