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**C16-M/CHOT/RAC-102****6052****BOARD DIPLOMA EXAMINATION, (C-16)****OCT/NOV—2018****DME—FIRST YEAR EXAMINATION****ENGINEERING MATHEMATICS-I***Time : 3 hours ]*

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

2. If  $A = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 5 & 4 \\ 2 & 3 & 7 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ , find  $7A-8B$

3. Using Laplace expansion, evaluate the determinant  $\begin{vmatrix} 2 & 1 & 5 \\ 3 & 2 & 7 \\ 4 & 8 & 11 \end{vmatrix}$

4. Show that  $\frac{\cos 37^\circ \sin 37^\circ}{\cos 37^\circ \sin 37^\circ} = \cot 8^\circ$

5. Show that  $\cos^4 A + \sin^4 A = \cos 2A$

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6. Find the conjugate of the complex number  $(3 + 4i)(2-3i)$
7. Find the perpendicular distance from the point  $(3,2)$  to the line  $4x + 5y - 6 = 0$ .
8. Find the equation of the line passing through the points  $(1,2), (3,4)$ .
9. Evaluate  $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x \sin 2x}$
10. Differentiate  $\log x \cdot \cot x$  w.r.t.  $x$ .

**PART—B**

5×10=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) Find the adjoint and inverse of the matrix  $\begin{pmatrix} 1 & 2 & 2 \\ 1 & 3 & 0 \\ 0 & 2 & 1 \end{pmatrix}$
- (b) Solve the equation by Cramer's method  $x + y + z = 9; 2x + 5y + 7z = 52; 2x + y + z = 0$
12. (a) Prove  $\cos A \cos(120^\circ - A) \cos(120^\circ + A) = 0$
- (b) Show that  $\tan^{-1} \frac{2}{3} + \tan^{-1} \frac{3}{4} = \tan^{-1} \frac{17}{6}$ .
13. (a) Solve  $\cos 5^\circ + \cos 3^\circ = 2 \cos 4^\circ \cos 1^\circ$
- (b) In any triangle  $ABC$ , show that  $(b + c) \cos A = a + b \cos C + c \cos B$ .
14. (a) Find the equation of the circle passing through the points  $(0,0), (5,2), (2,1)$ .
- (b) Find the equation of the hyperbola whose focus  $(2,2)$  and directrix is  $3x - 4y - 1 = 0$  with eccentricity is 2.

15. (a) Differentiate  $\log(\cos(e^{5x} \sin 3x))$  w.r.t.  $x$
- (b) Find  $\frac{dy}{dx}$ , if  $x^2 + y^2 + 2hxy + 2gx + 2fy + c = 0$
16. (a) Find  $\frac{dy}{dx}$ , if  $x = a \cos^3 t$  and  $y = b \sin^2 t$ . Also find  $\frac{d^2y}{dx^2}$ .
- (b) Verify Euler's theorem when  $u = x^2 + 2xy + y^2$ .
17. (a) Find the equation of tangent and normal to the curve  $y = x^2 - 3x + 5$  at the point (2,3).
- (b) A circular metal plate expands by heat, so that its radius increases the rate of 0.01 cm/sec. At what rate its area is increasing, when the radius is 20 cm?
18. (a) Find the maximum and minimum values of  $4x^3 - 9x^2 + 12x + 1$
- (b) The circumference of a circle is measured as 28 cm with an error of 0.04 cm. Find the approximate percentage error in the area of the circle.

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