

C16-C/CM-102

6017

BOARD DIPLOMA EXAMINATION, (C-16) SEPTEMBER/OCTOBER - 2020 DCE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS

Time: 3 hours]

 $3 \times 10 = 30$

Instructions: (1) Answer all questions.

- (2) Each question carries three marks.
- 1. Resolve $\frac{1}{(x-5)(x-7)}$ into partial fractions.

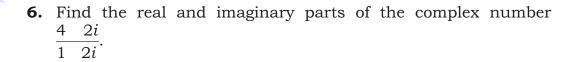
 2. If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, then find $A^2 = 3A$.

 3. Using Daplace's expansion find $A^2 = 3A$.
- 3. Using Daplace's expansion, find the value of $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$.
- **4.** Prove that

$$\frac{\cos 11^{\circ} \sin 11^{\circ}}{\cos 11^{\circ} \sin 11^{\circ}} \quad \tan 56^{\circ}$$

5. Prove that

$$\frac{1 \cos 2A}{\sin 2A} \cot A$$



- **7.** Find the perpendicular distance of the point (3, 2) to the line $3x \ 4y \ 10 \ 0$.
- **8.** Find the point of intersection of the lines 2x + 4y + 6 and x + 4y + 3.

9. Evaluate Lt
$$\frac{x^2}{x} = \frac{4}{x}$$
.

10. Find the derivative of $3 \tan x + 4 \log x + 7x^2$ with respect to x.

Instructions: (1) Answer any five questions.

- (2) Each question carries ten marks.
- **11.** (a) Prove that

nat
$$\begin{vmatrix}
1 & a & a^2 & b \\
1 & b & b^2 & (a & b)(b & c)(c & a) \\
1 & c & c^2 & c & c & c
\end{vmatrix}$$

- (b) Using matrix inversion method, solve the equations $2x \ y \ z \ 4$, $x \ y \ z \ 1$, $x \ 3y \ 2z \ 2$
- **12.** (a) Prove that

$$\frac{\cos 3A \quad \cos A}{\sin 3A \quad \sin A} \quad \cot 2A$$

- (b) If $\tan^{-1} x \tan^{-1} y \tan^{-1} z$, then prove that x y z xyz.
- **13.** (a) Solve sin $\cos \sqrt{2}$.
 - (b) Solve the triangle ABC with $a=1, b=2, c=\sqrt{3}$.

- **14.** (a) Find the equation of the circle with (5, 1) and (3, 7) as the end points of a diameter.
 - (b) Find the centre, foci, vertices, eccentricity, length of latus rectum and equations of the directrices of the ellipse $9x^2$ $25y^2$ 225.
- **15.** (a) Find $\frac{dy}{dx}$, if $y \sin^{-1}(3x + 4x^3)$.
- **16.** (a) If $y = x^{x^{x^{\dots \text{to}}}}$, then prove that

$$\frac{dy}{dx} = \frac{y^2}{x(1 + y \log x)}$$

- , then prove that $\frac{dy}{dx} = \frac{y^2}{x(1 + y \log x)} = \frac{1}{x} \frac{dy}{dx} = \frac{y^2}{x(1 + y \log x)}$ (b) If $y = \log(e^x e^y)$, then show that $\frac{z}{x} = \frac{2}{x} \frac{1}{y(1 + y \log x)}$ Find the angles. 17. (a) Find the angles between the curves y^2 4x and x^2
 - (b) A particle is moving along a straight line according to the laws $2t^3$ $3t^2$ 15t 18 (t in sec). Find its velocity, when its acceleration is zero.
- **18.** (a) The sum of two numbers is 24. Find the numbers when the sum of their squares is a minimum.
 - (b) The radius of a spherical balloon is increased by 2%. Find the approximate percentage increase in its surface area.