C16 - A/AA/BM/CH/CHST/AEI/MNG/MET/TT/IT/PCT - 102

6002

BOARD DIPLOMA EXAMINATION
JUNE - 2019
COMMON FIRST YEAR EXAMINATION
ENGINEERING MATHEMATICS - I

Time: 3Hours **Max. Marks : 80**

$\boxed{PART-A}$ $10 \times 3 = 30$

Instructions:

- Answer **ALL** questions and each question carries **THREE** marks
- Answers should be brief and straight to the point and shall not exceed **FIVE** simple sentences

(1)Resolve $\dfrac{2x}{(x-4)(x-5)}$ into Partial Fractions

(2)If $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 1 \\ -3 & 1 & 2 \end{bmatrix}$ then verify $(A+B)^T = A^T + B^T$

(3)Evaluate $\begin{vmatrix} 0 & y & -z \\ -y & 0 & x \\ z & -x & 0 \end{vmatrix}$

(4)If $A+B+C = 180^o$ then show that $tan\ 2A + tan\ 2B + tan\ 2C = tan\ 2A\ tan\ 2B\ tan\ 2C$

(5)Prove that $\dfrac{sin\ \theta + sin\ 2\theta}{1 + cos\ \theta + cos\ 2\theta} = tan\ \theta$

(6)Find the modules of the complex number $\dfrac{7+5i}{3-4i}$

(7)Find the slope of a line passing through the points $A(3,\ -7)$ and $B(2,\ -5)$ and also find its equation

(8)Find the distance between the parallel lines $11\ x - 3y + 39 = 0$ and $11x - 3y + 26 = 0$

(9) Evaluate $\lim_{x\to 0}\left(\frac{\sqrt{4+x}-\sqrt{4-x}}{x}\right)$

(10) Differentiate $cos(e^x + x^3)$ with respect to x

$\boxed{PART - B}$ $5 \times 10 = 50$

Instructions:

- Answer **ANY FIVE** questions and each question carries **TEN** marks
- The answers should be comprehensive and criteria for valuation is the content but not the length of the answer

(11) Solve the equations $x + 2y + 3z = 6$, $3x - 2y + z = 2$ and $4x + 2y + z = 7$ using matrix inversion method

(12) (a) Prove that $\frac{sin\ 85^o - sin\ 35^o}{cos\ 35^o - cos\ 85^o} = \frac{1}{\sqrt{3}}$

(b) Prove that $Tan^{-1}\left(\frac{m}{n}\right) - Tan^{-1}\left(\frac{m-n}{m+n}\right) = \frac{\pi}{4}$

(13) (a) Solve the equation $tan^2x + cot^2x = 2$

(b) In a $\Delta^{le}ABC$ prove that $\sum a\ cos^2\left(\frac{A}{2}\right) = s + \frac{\triangle}{R}$

(14) (a) Find the equation of the Circle with center at the point $(-3,\ 4)$ and passing through the Origin

(b) Find the center, vertices, eccentricity, foci and length of latus rectum of the Ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$

(15) (a) Differentiate $sin^{-1}(2x\sqrt{1-x^2})$ with respect to $sin^{-1}x$

(b) If $y = \sqrt{\frac{1}{x} + \sqrt{\frac{1}{x} + \sqrt{\frac{1}{x} + \ldots \infty}}}$ then show that $\frac{dy}{dx} = \frac{1}{x^2(1-2y)}$

(16) (a) If $y = a\ sin\ 2x + b\ cos\ 2x$ then show that $\frac{d^2y}{dx^2} - 4y = 0$

(b) If $u(x,\ y) = tan^{-1}(x^2 + xy + y^2)$, then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = sin\ 2u$

(17) (a) Find the lengths of tangent, normal, sub-tangent and sub-normal to the curve $y = x^2 + 2x + 1$ at the point $(1,\ 4)$

(b) The volume of a sphere is increasing at the rate of 10 *cub. inch/sec.* Find the rate of increase of its surface area and radius at the instant when the radius of the sphere is 10 *inch*

(18) (a) Find the dimension of a rectangle of maximum area having a perimeter 20 ft.

(b) Find an approximate value of $sin\ 61^o$ given that $1^o = 0.0175$ *radians*