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

6002

BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 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 $\dfrac{x-4}{(x-2)(x-3)}$ into Partial Fractions

(2) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$ then verify $(A+B)^T = A^T + B^T$

(3) Evaluate $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ if ω is a complex cube root of unity

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

(5) Prove that $cos^4 A - sin^4 A = cos\ 2A$

(6) Find the real and imaginary of parts of the complex number $\dfrac{1+3i}{1+i}$

(7) Find the equation of the line passing through the point $(7,\ 9)$ and having slope -3

(8) Find the equation of the straight line passing through the point $(-4,\ 3)$ and perpendicular to the line $3x + y - 31 = 0$

(9) Evaluate $\lim_{x\to 1}\left(\frac{x^2+5x-6}{x^2+x-2}\right)$

(10) Differentiate $\frac{1-e^x}{1+e^x}$ with respect to x

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 $2x+8y+5z=5$, $x+y+z=-2$ and $x+2y-z=2$ using matrix inversion method

(12) (a) Prove that $cos\ A + cos(120^o + A) + cos(120^o - A) = 0$

(b) Prove that $Tan^{-1}\left(\frac{3}{5}\right) + Tan^{-1}\left(\frac{3}{4}\right) = Tan^{-1}\left(\frac{27}{11}\right)$

(13) (a) Solve the equation $7\ sin^2 x + 3\ cos^2 x = 4$

(b) In a $\Delta^{le} ABC$ prove that $\sum a^3 sin(B-C) = 0$

(14) (a) Find the equation of the Circle with center at the point $(1,\ 2)$ and whose tangent is the line $3x-4y-1=0$

(b) Find the center, vertices, eccentricity, foci and length of latus rectum of the Ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$

(15) (a) Find $\frac{dy}{dx}$, if $y = tan^{-1}\left(\sqrt{\frac{1 - cos\ x}{1 + cos\ x}}\right)$

(b) Find $\frac{dy}{dx}$ if $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

(16) (a) If $y = sin(\log x)$ then show that $x^2y_2 + xy_1 + y = 0$

(b) If $u(x,\ y) = sin^{-1}\left(\frac{x^4 + y^4}{x + y}\right)$, then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3\ tan\ u$

(17) (a) Find the equations of tangent and normal to the curve $x = a(\theta - sin\ \theta)$, $y = a(1 - cos\ \theta)$ at $\theta = \frac{\pi}{4}$

(b) The displacement s of a particle is given at any time t by the relation $s = t^3 + 25t$. Find its velocity when the acceleration is 0

(18) (a) Find the maximum and minimum values of $f(x) = 4x^3 + 9x^2 - 12x + 1$

(b) If time and length of a simple pendulum is given by the equation $T = 2\pi\sqrt{\frac{l}{g}}$ where g is constant. Find the approximate percentage error in the calculated value of T corresponding to an error 1% in the value of l