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C16 - EE/CHPP - 102

BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 2019
COMMON FIRST YEAR EXAMINATION
ENGINEERING MATHEMATICS - I

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

$PART - A$ $10 \times 3 = 30$

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 $\dfrac{x^4}{x^2 - 3x + 2}$ into Partial Fractions

(2) If $A = \begin{bmatrix} 2 & -4 \\ -5 & 3 \end{bmatrix}$ then find AA^T

(3) Evaluate $\begin{vmatrix} 0 & q & -r \\ -q & 0 & p \\ r & -p & 0 \end{vmatrix}$

(4) Prove that $tan\ 9A - tan\ 5A - tan\ 4A = tan\ 9A\ tan\ 5A\ tan\ 4A$

(5) Prove that $cos(45^o + \theta) \cdot cos(45^o - \theta) = \dfrac{1}{2}\ cos\ 2\theta$

(6) Find the modulus amplitude form of the complex number $-\sqrt{3} - i$

(7) Find the intercepts made by the line $3x - 2y = 2$ on the co-ordinate axes

(8) Find the distance between the parallel lines $5x - y + 11 = 0$ and $5x - y + 13 = 0$

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(9) Evaluate $\lim_{x\to 0}\left(\frac{5x^2+x+1}{6x^2-3x-5}\right)$

(10) Differentiate $e^{3x} sin\ x$ 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) (a) Solve the equations $x+y+z=6$, $x-y+z=2$ and $2x+y-z=1$ by Crammer's Rule

(b) Find the adjoint of the matrix $\begin{bmatrix} cos\ \theta & sin\ \theta & 0 \\ -sin\ \theta & cos\ \theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(12) (a) Prove that $\frac{sin\ 3A\ sin\ 7A+sin\ A\ sin\ 11A}{sin\ 3A\ cos\ 7A+sin\ A\ cos\ 11A}=tan\ 8A$

(b) If $Tan^{-1}x+Tan^{-1}y+Tan^{-1}z=\frac{\pi}{2}$ then show that $xy+yz+zx=1$

(13) (a) Solve the equation $sin\ 3\theta-sin\ \theta=sin\ 5\theta$

(b) Solve the $\Delta^{le} ABC$ if $A=45^o$, $b=\sqrt{3}+1$, $C=60^o$

(14) (a) Find the equation of the Circle with center at the point $(1,\ -1)$ and whose tangent is the line $x+y+5\sqrt{2}=0$

(b) Find the center, vertices, eccentricity, foci and length of latus rectum of the Hyperbola $\frac{y^2}{9}-\frac{x^2}{4}=1$

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(15) (a) If $x = b(cos\ \theta + sin\ \theta)$, $y = a(cos\ \theta - sin\ \theta)$ then find $\frac{dy}{dx}$

(b) Find $\frac{dy}{dx}$ if $x^3 + y^3 = 3axy$

(16) (a) If $x = a\ cos\ \theta$, $y = b\ sin\ \theta$ then find $\frac{d^2y}{dx^2}$

(b) If $u(x,\ y) = sin^{-1}(x^2y + y^2x)$, 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 $y = x^2 - 2x + 1$ at the point where it cuts the x-axis

(b) The volume of a cube is increasing at the rate of 10 *cubic inches/sec.* Find the rate of increase of its surface area at the instant when the edge of the cube is 10 *inches*

(18) (a) The sum of two numbers is 72. Find them so that their product is maximum

(b) The radius of a spherical balloon is increased by 3%. Find the approximate percentage increase in its volume. Also find the approximate percentage increase in its surface area

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