

(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 154204

Roll No.

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B.TECH.**Theory Examination (Semester-II) 2015-16****ELEMENTARY MATHEMATICS-II****Time : 3 Hours****Max. Marks : 100****Section-A****Q1. Attempt all section. All section carries equal marks.****Write answer of each questions in short. (2×10=20)**

- (a) Express the following complex number in the form of $a + ib$, $(5i)\left(-\frac{3}{5}i\right)$.
- (b) Solve-the linear inequality $4x + 3 < 5x + 7$.
- (c) Find the value of n for ${}^n C_7 = {}^n C_5$.
- (d) Find the n^{th} term of an A.P. 5, 8, 11,
- (e) Find the slope of line passing through the points (3,-2) and (-1, 4).

- (f) Find the equation of circle whose centre is (3, 2) and radius is 5.
- (g) If $\vec{a} = 2\hat{i} - 3\hat{j}$ and $\vec{b} = 3\hat{i} + 2\hat{j}$. Show that $|\vec{a}| = |\vec{b}|$.
- (h) Find the dot product of two vectors
 $\vec{a} = 2\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{b} = 3\hat{i} + 4\hat{j} + 12\hat{k}$.
- (i) If a line makes an angle 90° , 60° and 30° with positive direction of x axis, y axis and z axis respectively. Find its direction cosine.
- (j) Find the equation of plane with intercepts 2, 3 and 4 on the x , y and z axis respectively.

Section-B

Q2. Attempt any five questions from this section. (5×10=50)

- (a) Solve the following system of inequalities by graphical method.
 $2x + y \geq 6$, $3x + 4y \leq 12$.
- (b) Find the number of arrangements of the letters of the word "INDEPENDENCE". In how many these arrangements-
- (i) do the words start with P.
- (ii) do the all vowel always occur together.
- (iii) do the words begin with 'I' and end in 'E'.

(2)

- (c) The first terms of A.P. is 2 and last term is 59. Find common difference if sum of all its terms is 610.
- (d) Find the equation of line passing through the point (2, 2) and cutting off intercepts on the axis whose sum is 9.
- (e) Find the equation of circle which passing through the points (1, 0), (0, -6) and (3, 4).
- (f) Find eccentricity, co-ordinate of foci, and length of latus rectum for the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$
- (g) Find the area of parallelogram whose adjacent sides are given by vectors $\vec{a} = 3\hat{i} + \hat{j} + 4\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$.

Section-C

Attempt any two question.

(15×2=30))

- Q3. If p and p be the perpendiculars from origin upon the straight lines $x \sec \theta + y \operatorname{cosec} \theta = a$ and $x \cos \theta - y \sin \theta = a \cos 2\theta$ respectively. Prove that $4p^2 + p^2 = a^2$
- Q4. Find angle between the line vectors

$$\vec{r}_1 = 3\hat{i} - 2\hat{j} + \hat{k} \text{ and } \vec{r}_2 = 4\hat{i} + 5\hat{j} + 7\hat{k}$$

(3)

Q5. Find shortest distance between two lines whose vector equations are

$$\vec{r} = (\hat{i} + 2\hat{j} + \hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k})$$

$$\vec{r} = (2\hat{i} - \hat{j} - \hat{k}) + \mu(2\hat{i} + \hat{j} + 2\hat{k})$$