

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

Paper ID : 154204

Roll No. 

--	--	--	--	--	--	--	--	--	--	--	--

**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  $"C_7 = "C_5$ .

(d) Find the  $n^{\text{th}}$  term of an A.P. 5, 8, 11, .....

(e) Find the slope of line passing through the points (3,-2) and (-1, 4).

**(1)****P.T.O.**

(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  $90^\circ$ ,  $60^\circ$  and  $30^\circ$  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 arrangement-

- (i) do the words start with P.
- (ii) do the all vowel always occur together.
- (iii) do the words begin with T' and end in 'P'.

(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 passes 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  $x\sec\theta + y\cosec\theta = a$  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

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

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

(4)