

[This question paper contains 5 printed pages.]

578

Your Roll No. ....

B.Com. (Hons.)/ II/ NS

E

Paper XV – MATHEMATICS

Time : 2 Hours

Maximum Marks : 50

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Note :- The maximum marks printed on the question paper are applicable for the candidates registered with the School of Open Learning for the B.A. (Hons.)/ B.Com.(Hons.). These marks will, however, be scaled down proportionately in respect of the students of regular colleges, at the time of posting of awards for compilation of result.*

*All questions are compulsory.*

1. Attempt any three parts:

- (a) Find the equation of a line which passes through the point  $(-4, 2)$  and moves in the direction of  $(-1, 1)$  in parametric form. Transform it into slope and intercept form. (5)

P.T.O.

(b) Determine whether the set of vectors :

$$S = \{(1, 0, 1, 2), (0, 1, 1, 2), (1, 1, 13)\}$$

in  $\mathbb{R}^4$  is linearly independent or dependent? (5)

(c) Let  $V$  be a vector space in  $\mathbb{R}^3$  and

$$S = \{(1, 1, 0), (1, 0, 1), (0, 1, 1)\}$$

Does  $S$  span  $V$ ? (5)

(d) Find the cosine of the angle between the vectors

$$\vec{u} = (0, 2, 3, 1) \text{ and } \vec{v} = (-3, 1, -2, 0). \quad (5)$$

2. Attempt any **three** parts:

(a) Find the first five terms of the following sequence:

$$a_1 = 2, a_2 = -1, a_{n+2} = \frac{a_{n+1}}{an} \quad (5)$$

(b) Determine whether the following sequences converge or diverge :

$$(i) \left\{ (-1)^{n+1} \frac{n}{3n+1} \right\}_{n \in \mathbb{N}}$$

$$(ii) \left\{ \frac{3-7n^4}{n^4+1} \right\}_{n \in \mathbb{N}} \quad (5)$$

- (c) Determine whether the series converges or diverges :

$$(i) \sum_{n=1}^{\infty} 3^{2n} 5^{1-n}$$

$$(ii) \sum_{n=1}^{\infty} \frac{1}{n(n+1)} \quad (5)$$

- (d) State limit comparison test and determine whether the series

$$\sum_{n=1}^{\infty} \frac{1}{2n^2 + n}$$

Converges or diverges? (5)

3. Attempt any two parts:

- (a) Write the general forms of the following statements in SPARKS:

(i) While-do

(ii) for

(iii) repeat-until (3½)

- (b) Find the greatest common division of the pair

(26, 354) (3½)

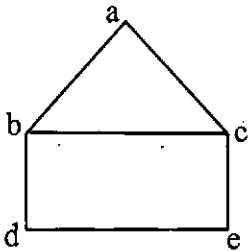
- (c) Show that  $f(n) = 5n^5 - 3n^4 + 2n^3 - 6n + 8$  is 'Big oh' of  $n^5$ . (3½)

4. Attempt any two parts :

- (a) Find the graph whose adjacency matrix is given by :

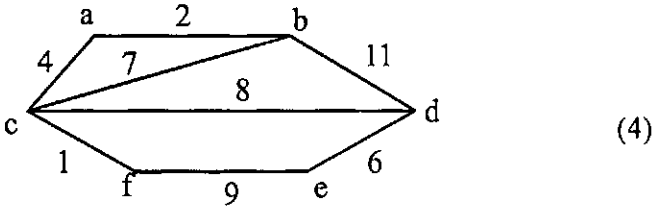
$$\begin{array}{c}
 \begin{array}{cccc}
 & p_1 & p_2 & p_3 & p_4 \\
 p_1 & \left[ \begin{array}{cccc}
 0 & 1 & 0 & 1 \\
 0 & 0 & 1 & 1 \\
 0 & 1 & 0 & 1 \\
 1 & 0 & 1 & 0
 \end{array} \right] \\
 p_2 \\
 p_3 \\
 p_4
 \end{array}
 \end{array}
 \quad (4)$$

- (b) Determine a tree and a spanning tree for the connected graph given below:



(4)

- (c) Find minimal spanning tree for the graph shown below



5. Determine the optimum strategies and the value of the game for the following:

$$P_2 \begin{matrix} \\ \\ \end{matrix} \begin{matrix} 5 & 1 \\ 3 & 4 \end{matrix} \quad P_1 \quad (5)$$

**OR**

Using dominance, solve the following game.

	I	II	III	IV
1	18	4	6	4
2	6	2	13	7
3	11	5	17	3
4	7	6	12	2

(5)