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 paint $(-4, 2)$ 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 linarly 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

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

2. Attempt any **three** parts:

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

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

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

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

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

(c) Determine whether the series converges or diverges :

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

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

(d) State limit comparison text 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)

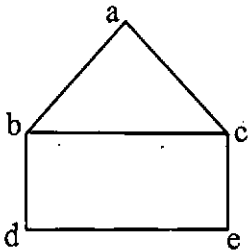   (b) Find the greatest common division of the pair (26, 354)   (3½)

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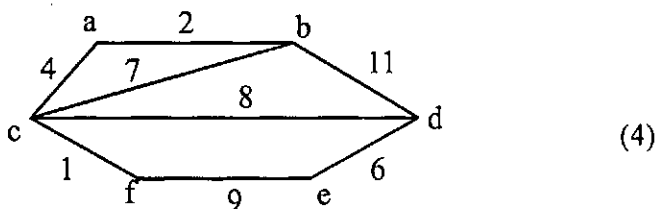
(a) Find the graph whose adjacency matrix is given by :

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

(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

(4)

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

$$p_1 \begin{array}{c} p_2 \\ \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{array}$$

(5)

OR

Using dominance, solve the following game.

$$\begin{array}{c} \quad\ \text{I}\quad \text{II}\ \ \text{III}\ \ \text{IV} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{bmatrix} 18 & 4 & 6 & 4 \\ 6 & 2 & 13 & 7 \\ 11 & 5 & 17 & 3 \\ 7 & 6 & 12 & 2 \end{bmatrix} \end{array}$$

(5)

(100)