[This question paper contains 4 printed pages.]

5794   *Your Roll No.* ....

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

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 an equation of the plane that passes through
    the point P(2, 6, 1) and has the vector $\vec{n}(1,4,2)$ as
    a normal.   (5)

    (b) Find a matrix representation for the reflection about
    x-axis in $\mathbb{R}^2$.   (5)

P.T.O.

(c) Find the eigenvalues and corresponding eigenvectors of the matrix :

$$\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 3 \end{bmatrix}$$ (5)

(d) Determine whether the set of vectors

$S = \{(1, 2, -1), (1, -2, 1), (-3, 2, -1), (2, 0, 0)\}$

is linearly independent ?   (5)

2. Attempt any **three** parts :

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

(i) $\left\{\dfrac{\log n}{n}\right\}_{n=1}^{\infty}$ (ii) $\{2\}_{n=1}^{\infty}$

(iii) $\left\{1 + (-1)^n\right\}_{n=1}^{\infty}$ (iv) $\left\{\dfrac{n}{2^n}\right\}_{n=1}^{\infty}$

(v) $\left\{\dfrac{\pi^n}{4^n}\right\}_{n=1}^{\infty}$ (5)

(b) Test the convergence of the following series :

(i) $\displaystyle\sum_{n=1}^{\infty}\left(\dfrac{-3}{4}\right)^{K-1}$ (ii) $\displaystyle\sum_{K=2}^{\infty}\dfrac{1}{K^2 - 2}$ (5)

(c) State ratio test for the convergence of a series and then test the convergence of the series

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

(d) State root test for the convergence and test the convergence of the following series :

$$\sum_{n=1}^{\infty} \left(\frac{3n+2}{3n-1} \right)^n$$

using the root test.   (5)

3.   Attempt any **two** parts :

(a) Find the greatest common divisor of the pair

(48, 120)   (3½)

(b) Show that $f(n) = 16n^4 - 20n^3 + 6n^2 - 5$ is 'big oh' of n^4.   (3½)

(c) Write the general forms of the following statements of the 'SPARKS' program :

   (i) repeat-until
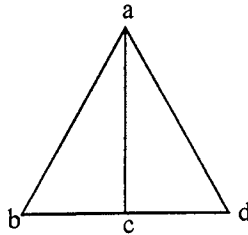
   (ii) do-while

   (iii) for   (3½)

4.   Attempt any **two** parts :

(a) Find the graph that have the following adjacency matrix :

$$\begin{bmatrix} 1 & 2 & 1 & 2 \\ 2 & 0 & 2 & 1 \\ 1 & 2 & 1 & 0 \\ 2 & 1 & 0 & 0 \end{bmatrix}$$ (4)
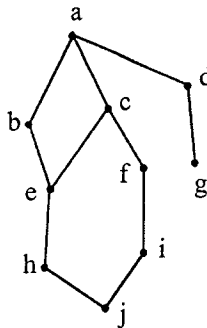
(b) Find all spanning trees of the graph given below :

(4)

(c) Find the depth-first tree for the following :

(4)

5. Consider a modified form of matching biased coins game problem. The matching player is paid Rs. 8.00. if the two coins turn both heads and Re. 1.00 if the coins turn both tails. The non-matching player is paid Rs. 3.00 when the two coins do not match. Given the choice of being the matching or non-matching player, which one would you choose and would be the best strategy ?

OR

Solve the following game using dominance property :

Player B

Player A $\begin{bmatrix} 1 & 2 & 3 & -1 \\ 2 & 2 & 1 & 5 \\ 3 & 1 & 0 & -2 \\ 4 & 3 & 2 & 6 \end{bmatrix}$

(5)

(200)