MATHEMATICS

(Three hours)

(Candidates are allowed additional 15 minutes for only reading the paper.

They must NOT start writing during this time.)

Section A - Answer Question 1 (compulsory) and five other questions.

Section B and Section C - Answer two questions from either Section B or Section C.

All working, including rough work, should be done on the same sheet as, and adjacent to,

the rest of the answer.

The intended marks for questions or parts of questions are given in brackets [].

Mathematical tables and graph papers are provided.

Slide rule may be used.

SECTION A

Question 1

[10×3]

- (i) If (A-2I)(A-3I)=0, where $A=\begin{pmatrix} 4 & 2 \\ -1 & x \end{pmatrix}$ and $I=\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, find the value of x.
- (ii) Find the value(s) of k so that the line 2x + y + k = 0 may touch the hyperbola $3x^2 y^2 = 3$.
- (iii) Prove that: $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \frac{1}{2}\sin^{-1}\frac{4}{5}$
- (iv) Using L'Hospital's Rule, evaluate:

$$\lim_{x\to 0} \left(\frac{e^x - e^{-x} - 2x}{x - \sin x} \right)$$

- (v) Evaluate: $\int \frac{1}{x + \sqrt{x}} dx$
- (vi) Evaluate: $\int_{0}^{1} \log \left(\frac{1}{x} 1\right) dx$
- (vii) Two regression lines are represented by 4x + 10y = 9 and 6x + 3y = 4. Find the line of regression of y on x.
- (viii) If 1, w and w^2 are the cube roots of unity, evaluate $(1 w^4 + w^8)(1 w^8 + w^{16})$

This Paper consists of 5 printed pages and 1 blank page.

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