

Mathematics

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Time: 3 hrs.

Full Marks: 100

Pass Marks: 35 (For partial students only)

Attempt all questions.

Group 'A'

5 × 3 × 2 = 30

1. a. Find the truth value of the biconditional statement of p and q where p represents '2 is an even number' and q represents '4 is an even number'.
b. If $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 2x - 3$, find f^{-1}
c. Test the even or odd nature and symmetricity of the function $y = 8x^2$
2. a. Express $\tan^{-1}x$ in terms of inverse of sin function.
b. Prove by mathematical induction: $1 + 3 + 5 + \dots + (2n - 1) = n^2$
c. Find the adjoint of the matrix $\begin{pmatrix} 2 & 5 \\ 3 & -7 \end{pmatrix}$
3. a. Using Cramer's rule, solve: $3x + 2y + 9 = 0$, $2x - 3y + 6 = 0$
b. Express $\sqrt{3} + i$ in polar form.
c. If one root of the equation $ax^2 + bx + c = 0$ be twice the other, show that $2b^2 = 9ac$
4. a. Find the equation of the straight line that has y - intercept '2' and is parallel to $4x - 8y + 3 = 0$
b. Find the equation of the circle which passes through origin and makes equal intercepts on both axes.
c. Evaluate : $\lim_{x \rightarrow 0} \frac{1 - \cos nx}{1 - \cos mx}$

Contd...

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