TIME: 2 HRS

MM: 40

General Instructions:
1. This question paper contains three sections – A, B and C. Each part is compulsory.
2. Section - A has 6 short answer type (SA1) questions of 2 marks each.
3. Section - B has 4 short answer type (SA2) questions of 3 marks each.
4. Section - C has 4 long answer type questions (LA) of 4 marks each.
5. There is an internal choice in some of the questions.
6. Q14 is a case-based problem having 2 sub parts of 2 marks each.

Q1. If sin A + cosec A= 2 ,find the value of $\sin^2 A + \cosec^2 A$

Q2. If A and B be two events having P(AUB)=1/2 and P(A')=2/3,then find P(A' $\cap$ B)

Q3. Solve $\frac{5-2x}{3} \le \frac{x}{6} - 5, x \in R$

Q4. Find the derivative of $\sqrt{\tan(2x)}$

Q5. Find the length of latus rectum of the ellipse having equation $20x^2 + 36 y^2 = 720$

OR

Find the centre and radius of the circle $4x^2 + 4y^2 - 10x + 5y + 5 = 0$

Q6. The foci of hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of hyperbola if its eccentricity is 2.

Q7.Prove that: $\frac{\sin A \sin 2A + \sin 3A \sin 6A}{\sin A \cos 2A + \sin 3A \cos 6A} = \tan 5A$

OR

Prove that $\sqrt{2 + \sqrt{2 + 2\cos 4x}} = 2 \cos x$, $0 < x < \frac{\pi}{4}$

Q8. Find the derivative of $\frac{1}{ax} + a \cosec x \tan x$

OR

Find the dy/dx if $y = \frac{x^n - a^n}{x^n + a^n}$ for some constant a

Q9. A point R with x- coordinate 4 lies on the line segment joining the points P (2,3,-4) and Q (8,0,10).Find the coordinates of the point R.

Q10. Four cards are drawn from a pack of 52 cards.What is the probability that all four cards are of

a) Same suit   b) different suit

Q11. Find the derivative of sec(x+1) by first principle.

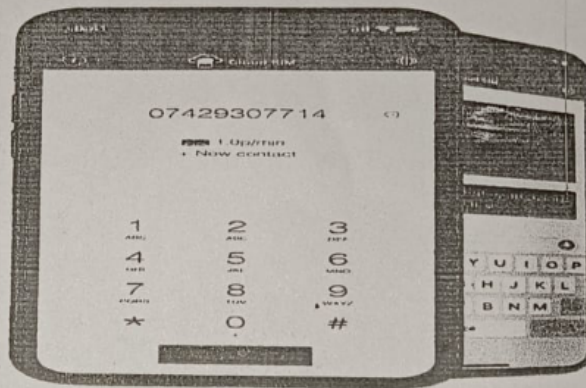Q12. Solve graphically the following system of inequations and write the coordinates of the solution region :

$3y-2x \le 4,$ $\quad$ $x+y \le 5$ and $\quad x \le 0$

Q13. Prove that $\cos^2 x + \cos^2\left(x+\frac{\pi}{3}\right) + \cos^2\left(x-\frac{\pi}{3}\right) = \frac{3}{2}$

OR

If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then prove that $\cos 2\alpha + \cos 2\beta = -2\cos(\alpha+\beta)$

Q14.

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A mobile number is having 10 digits. All mobile numbers have three things in common ,a 2-digit access code(AC),a 3-digit provider code (PC) and a 5-digit subscriber code (SC)

- How many mobile numbers are possible if both digits of AC code are different and must be greater than 6 , PC code is 123 .

- How many mobile numbers starting with 98073 are possible which are divisible by 5 and all digits can be used only once.