MATHEMATICS		TIME: 2 HRS 30 MINUTES
GROUP : FIRST	SUBJECTIVE PART	MARKS: 80

SECTION-I

DGK-1-24

QUESTION NO. 2 Write short answers any Eight (8) of the following 16

i	Simplify $(7, 9) + (3, -5)$
ii	Find the multiplicative inverse of $(-4, 7)$
iii	$\forall z \in C$, prove that $z.\bar{z} = \mid z \mid^2$
iv	Simplify i^{-10}
v	Write the power set of $\{9, 11\}$
vi	Construct the truth table for $(p \wedge \sim p) \rightarrow q$
vii	Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$
viii	If A and B are square matrices of the same order, then explain why in general $(A+B)^2 \neq A^2 + 2AB + B^2$
ix	Without expansion show that $\begin{vmatrix} 6 & 7 & 8 \\ 3 & 4 & 5 \\ 2 & 3 & 4 \end{vmatrix} = 0$
x	Solve the equation $x^2 - 2x - 899 = 0$ by completing the square
xi	Evaluate $\omega^{28} + \omega^{29} + 1$
xii	Find the condition that one root of equation $x^2 + px + q = 0$ is double the other.

QUESTION NO. 3 Write short answers any Eight (8) of the following 16

i	Define an identity
ii	Change $\frac{6x^3+5x^2-7}{2x^2-x-1}$ in to proper fraction
iii	Find the next two terms 1, 3, 7, 15, 31, ---------
iv	If $a_{n-3} = 2n-5$, find the nth term of the sequence
v	Show that the reciprocals of the terms of the geometric sequence a_1, a_1r^2, a_1r^4, ---------- form another geometric sequence
vi	Find A.M between $x-3$ and $x+5$
vii	Find the value of n when ${}^nP_4 : {}^{n-1}P_3 = 9 : 1$
viii	Find the value of n when ${}^nC_{10} = \frac{12 \times 11}{2!}$
ix	Determine the probability of getting 2 heads and 2 tails when a coin is tossed four times
x	Prove $1 + 4 + 7 + \text{--------} + (3n-2) = \frac{n(3n-1)}{2}$
xi	Calculate by means of Binomial theorem $(0.97)^3$
xii	Expand $(8 - 5x)^{-2/3}$ up to four terms.

(P.T.O)

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QUESTION NO. 4 Write short answers any Nine (9) of the following 18

i	If $\tan\theta = \frac{8}{15}$ and terminal arm of the angle is in the III quadrant, find the value of $\sin\theta$ and $\cos\theta$
ii	Prove that $\sec^2\theta - \operatorname{cosec}^2\theta = \tan^2\theta - \cot^2\theta$
iii	If α, β, γ are angles of a triangle ABC, Prove that $\tan(\alpha+\beta) + \tan\gamma = 0$
iv	Find value of $\sec 75^\circ$, without using tables
v	Prove that $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ = 0$
vi	Write the domain and range of $y = \tan x$
vii	Find the period of $\operatorname{cosec} 10x$
viii	Draw the graph of $y = \sin\frac{x}{2}$ for $0 \le x \le 2\pi$
ix	Find the smallest angle of the triangle ABC, when $a = 37.34, b = 3.24, c = 35.06$
x	Find area of triangle ABC, if $a = 18, b = 24, c = 30$
xi	Prove that $r\,r_1\,r_2\,r_3 = \Delta^2$
xii	Without using calculator, show that $2\cos^{-1}\frac{4}{5} = \sin^{-1}\frac{24}{25}$
xiii	Find the solution of equation $\operatorname{cosec}\theta = 2$ which lies in $[0, 2\pi]$

SECTION-II

Note: Attempt any Three questions from this section 10 x 3 = 30

Q.5- (A)	For what values of m, will the roots of the equation $x^2 - 2(1+3m)x + 7(3+2m) = 0$ be equal
(B)	Solve the system linear equations by Cramer's Rule $2x_1 - x_2 + x_3 = 8$, $x_1 + 2x_2 + 2x_3 = 6$, $x_1 - 2x_2 - x_3 = 1$
Q.6- (A)	Resolve into partial fractions $\frac{1}{(1-ax)(1-bx)(1-cx)}$
(B)	If $y = \frac{2}{3}x + \frac{4}{9}x^2 + \frac{8}{27}x^3 + \cdots$ and if $0 < x < \frac{3}{x}$, then show that $x = \frac{3y}{2(1+y)}$
Q.7-(A)	Prove that ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^{n}C_r$
(B)	If x is so small that its square and higher powers can be neglected, show that $\frac{1-x}{\sqrt{1+x}} \approx 1 - \frac{3}{2}x$
Q.8-(A)	Show that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$
(B)	By using $\Delta = \frac{1}{2}bc\sin\alpha$ drive the Hero's formula
Q.9-(A)	If $\cot\theta = \frac{5}{2}$ and the terminal arm of the angle is in the I quad, find the value of $\frac{3\sin\theta + 4\cos\theta}{\cos\theta - \sin\theta}$
(B)	Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$