GROUP : FIRST | 11 CLASS – 1 Annual 2024 | MARKS : 20

OBJECTIVE

NOTE: You have four choices for each objective type question as A , B , C and D . The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question.

QUESTION NO. 1

DGK-1-24

1 Factorial form of $(n+1)(n)(n-1)$ is

(A) $\frac{(n+1)!}{(n-2)!}$ (B) $\frac{(n-2)!}{(n+1)!}$ (C) $\frac{(n+1)!}{n!}$ (D) $\frac{n!}{(n+1)!}$

2 $(2+i)^2 - (2-i)^2$ = ----------

(A) $4i$ (B) $8i$ (C) $6i$ (D) $10i$

3 Value of $\sin^2 \pi/4 + \cos^2 \pi/4$ = ----------

(A) 0 (B) -1 (C) 1 (D) $\frac{1}{\sqrt{2}}$

4 Sec $(\pi/2 - \theta)$ = ----------

(A) - sec θ (B) - cosec θ (C) sec θ (D) cosec θ

5 Period of cosec x is ----------

(A) 2π (B) π (C) 3π (D) $\pi/2$

6 Radius of escribed circle opposite to vertex A of triangle is ----------

(A) $\frac{\Delta}{S}$ (B) $\frac{\Delta}{S-a}$ (C) $\frac{\Delta}{S-b}$ (D) $\frac{\Delta}{S-c}$

7 Cos $x = \frac{1}{2}$, then x = ----------

(A) $\pi/6$ (B) $\pi/4$ (C) $\pi/3$ (D) $\pi/2$

8 Sin $(\text{Cos}^{-1}\sqrt{3}/2)$ = ----------

(A) $\pi/6$ (B) $\pi/3$ (C) $\frac{2}{\sqrt{3}}$ (D) ½

9 1 is not ---------- number

(A) Odd (B) Real (C) Prime (D) Rational

10 Multiplicative inverse of complex number (0,1)

(A) (0 , -1) (B) (-1 , 0) (C) (1 , 0) (D) (0 , 1)

11 Set G is closed and associative with respect to binary operation, then set G is called

(A) Groupoid (B) Semi-Group (C) Monoid (D) Group

12 Disjunction of two statements p and q is

(A) $p \wedge q$ (B) $p \vee q$ (C) $p \rightarrow q$ (D) $p \leftrightarrow q$

13 Tabular form of $\{ x \mid x \in N \wedge x + 4 = 0 \}$ is

(A) { } (B) {0} (C) {-4} (D) {0,4}

14 A square matrix A is symmetric if A^t =

(A) A^t (B) $-A^t$ (C) A (D) - A

15 If order of matrix A is 2 x 5 and order of B is 5 x 7 , then order of AB is ----------

(A) 5 x 2 (B) 7 x 5 (C) 7 x 2 (D) 2 x 7

16 α , β are roots of $x^2+2x+1=0$, then $\alpha^2+\beta^2$ = ----------

(A) 8 (B) 4 (C) -2 (D) 2

17 If ω is cube root of unity, then $(1+\omega+\omega^2)^2$ = ----------

(A) ω (B) ω^2 (C) 0 (D) 1

18 $\frac{2}{x^2-1} = \frac{1}{x-1} + \frac{B}{x+1}$, then value of B is

(A) 1 (B) -1 (C) 2 (D) -2

19 Sum the series $1 + \frac{9}{10} + \frac{81}{100} +$ ----------

(A) 10 (B) 9 (C) 9/10 (D) $\frac{10}{9}$

20 5^{th} term of sequence whose general term is $a_n = n + (-1)^n$ is

(A) 4 (B) -4 (C) 5 (D) -5

D

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 $z.\bar{z} = \lvert z \rvert^2$
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)

D

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 $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$

GROUP : SECOND	11th CLASS – 1st Annual 2024	MARKS : 20
	OBJECTIVE	

NOTE: You have four choices for each objective type question as A , B , C and D . The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question.

DGK-2-24

QUESTION NO. 1

1 Number of necklaces can be made from 6 beads
(A) 720 (B) 120 (C) 90 (D) 60

2 Middle term in expansion of $(3 + x)^4$ is
(A) $81x^2$ (B) $54x^2$ (C) $26x^2$ (D) $108x^2$

3 One degree is equal to ..... radian
(A) $\frac{180}{\pi}$ (B) $\frac{\pi}{180}$ (C) $\frac{\pi}{90}$ (D) π

4 $\cot(90 - \alpha)$ = ...
(A) $\tan\alpha$ (B) $-\tan\alpha$ (C) $\cot\alpha$ (D) $-\cot\alpha$

5 Period of sin x/3 is
(A) 2π (B) $2\pi/3$ (C) 6π (D) 3π

6 $\cos\alpha/2$ = ...
(A) $\frac{s(s-a)}{bc}$ (B) $\frac{s(s-b)}{ac}$ (C) $\sqrt{\frac{s(s-a)}{bc}}$ (D) $\sqrt{\frac{s(s-b)}{ac}}$

7 $\sec(\cos^{-1}\frac{1}{2})$ = ----------
(A) 1/2 (B) 2 (C) $\pi/3$ (D) $\pi/6$

8 If $\cos x = -\sqrt{3}/2$, then value of x is
(A) $\frac{5\pi}{6}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{3}$ (D) $-\pi/3$

9 $a < b \Rightarrow -a > -b$, $a, b \in R$ property used is
(A) Transitive (B) Additive (C) Multiplicative (D) Trichotomy

10 If $Z = 1 - i$, then $|Z|$ = ...
(A) 2 (B) -2 (C) $\sqrt{-2}$ (D) $\sqrt{2}$

11 A and B are disjoint sets then
(A) $A \cap B = \emptyset$ (B) $A \cup B = \emptyset$ (C) $A - B = \emptyset$ (D) $B - A = \emptyset$

12 Tabular form of $\{x \mid x \in E \wedge 2 < x \leq 4\}$
(A) {2 , 3 , 4} (B) {2 , 4} (C) {4} (D) { ∅ }

13 The set A has m elements , Number of elements in power set of A
(A) 2^{m-1} (B) 2^m (C) 2^{m+1} (D) $2^{m/2}$

14 Rank of $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ is
(A) Zero (B) 1 (C) - 1 (D) 2

15 Determinant of [-5] is
(A) Zero (B) Not possible (C) - 5 (D) 5

16 α , β are roots of $ax^2 - bx + c = 0$, then $\alpha + \beta$ = ----------
(A) $\frac{b}{a}$ (B) $-\frac{b}{a}$ (C) $\frac{c}{a}$ (D) $-\frac{c}{a}$

17 If polynomial $x^2 - 2x + 2$ is divided by $x - 1$, then remainder is
(A) -1 (B) 1 (C) 0 (D) 2

18 Partial fraction of $\frac{x}{(x-1)(x+2)} = \frac{1}{3(x-1)} + \frac{B}{x+2}$, then value of B is
(A) -3/2 (B) 3/2 (C) 2/3 (D) -2/3

19 Sum of n-arithmatic means between a and b is
(A) $\frac{a+b}{2}$ (B) n(a+b) (C) (a+b) (D) $n\left(\frac{a+b}{2}\right)$

20 Next term of sequence 7 , 9 , 12 , ... Is
(A) 14 (B) 15 (C) 16 (D) 18

D

11th CLASS – 1st Annual 2024

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

SECTION–I

DAK-2-24

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

i	Simplify (5, -4) (-3 , -2)
ii	Separate into real and imaginary parts $\frac{2-7i}{4+5i}$
iii	Prove that $\bar{Z} = Z$ if Z is real
iv	Simplify $(a+bi)^2$
v	Write two proper subsets of { a , b , c }
vi	Show that $(p \wedge q) \rightarrow p$ is a tautology
vii	Find x and y if $\begin{bmatrix} 2 & 0 & x \\ 1 & y & 3 \end{bmatrix} + 2\begin{bmatrix} 1 & x & y \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 6 & 1 \end{bmatrix}$
viii	Find the matrix X if $\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} X = \begin{bmatrix} 2 & 1 \\ 5 & 10 \end{bmatrix}$
ix	If $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & -2 & 0 \\ -2 & -2 & 1 \end{bmatrix}$, then find A_{12} and A_{32}
x	Evaluate $\omega^{28} + \omega^{29} + 1$
xi	Use remainder theorem to find the remainder when $x^2 + 3x + 7$ is divided by $x + 1$
xii	Discuss the nature of the roots of equation $2x^2 - 5x + 1 = 0$

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

i	Define partial fraction resolution
ii	Suppose $\frac{7x+25}{(x+3)(x+4)} = \frac{A}{x+3} + \frac{B}{x+4}$ Find the values of A and B
iii	Write the first four terms of the following sequence , if $a_n = (-1)^n n^2$
iv	Which term of the A.P 5 , 2 , - 1 , ... is - 85 ?
v	If $\frac{1}{a}$, $\frac{1}{b}$ and $\frac{1}{c}$ are in G.P. Show that the common ratio is $\pm\sqrt{\frac{a}{c}}$
vi	Show that $G^2 = AH$ if $a = 2i$, $b = 4i$
vii	Find the value of n if ${}^nP_2 = 30$
viii	Find the number of the diagonals of a 6-sided figure
ix	A die is rolled. What is the probability that the dots on the top are greater than 4 ?
x	Prove that $4^k > 3^k + 4$ is true for k = 2 , 3
xi	Calculate $(0.97)^3$ by means of binomial theorem
xii	Expand up to 4 terms $(1-x)^{1/2}$, taking the values of x such that the expansion is valid

(P.T.O)

D

DGK-2-24

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

i	Find ℓ , when $\theta = 65^\circ 20'$, r = 18 mm
ii	Verify that $2 \sin 45^\circ + \frac{1}{2} \operatorname{cosec} 45^\circ = \frac{3}{\sqrt{2}}$
iii	Without using the tables , find the value of sec (- 300)
iv	Prove that $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$
v	Prove that $1 + \tan \alpha \tan 2\alpha = \sec 2\alpha$
vi	Write down the domain and range of $\sin x$
vii	Find the period of $\cot \frac{x}{2}$
viii	Draw the graph of $y = \cos x$ for $0 \leq x \leq 360^\circ$
ix	What is difference between right angle triangle and oblique triangle
x	Find the area of the triangle ABC , if $a = 200$, $b = 120$, $\gamma = 150^\circ$
xi	Find the radius of in-circle if $a = 13$, $b = 14$, $c = 15$
xii	Without using calculator , show that $\tan^{-1} \frac{5}{12} = \sin^{-1} \frac{5}{13}$
xiii	Solve the equation $\sin x + \cos x = 0$

SECTION-II

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

Q.5- (A)	Solve the equation $\sqrt{5x^2 + 7x + 2} - \sqrt{4x^2 + 7x + 18} = x - 4$
(B)	Use matrices to solve the following system of equation $2x_1 + x_2 + 3x_3 = 3$ $x_1 + x_2 - 2x_3 = 0$ $-3x_1 - x_2 + x_3 = -4$
Q.6- (A)	Resolve the following into partial fractions $\frac{x^2}{(x-2)(x-1)^2}$
(B)	Find n so that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be the A.M. between a and b
Q.7-(A)	A natural number is chosen out of the first fifty natural numbers. What is the probability that the chosen number is multiple of 3 or 5 ?
(B)	Expand $\left(\frac{x}{2} - \frac{2}{x^2}\right)^6$ by using binomial theorem
Q.8-(A)	Show that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{8}$
(B)	The sides of triangle are $x^2 + x + 1$, $2x + 1$ and $x^2 - 1$ Prove that the greatest angle of the triangle is 120°
Q.9-(A)	Prove that : $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$ Where θ is not an odd multiple of $\frac{\pi}{2}$
(B)	Prove that : $\cos^{-1} A + \cos^{-1} B = \cos^{-1} [AB - \sqrt{1 - A^2}\sqrt{1 - B^2}]$