MATHEMATICS   DGK-11-2-23   **OBJECTIVE**   TIME: 30 MINUTES
GROUP : SECOND   **MARKS: 20**

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 mark in that question.

QUESTION NO. 1

1	If $x^{1/4} = -2$ then x = _____
	(A) 8 (B) -8 (C) 16 (D) -16
2	If w is the cube root of unity. Then $(1 + w - w^2)^8$ = _____
	(A) 256 (B) -256 (C) $-256\,w$ (D) $256\,w$
3	Degree of a constant polynomial is
	(A) 1 (B) 0 (C) 2 (D) 3
4	A.M between $1-x+x^2$ and $1+x+x^2$ is
	(A) $x^2 + 1$ (B) $x+1$ (C) $\frac{x+1}{2}$ (D) $\frac{x^2+1}{2}$
5	If $a_n = (-1)^n (2n - 3)$ Then a_5 = _____
	(A) 7 (B) -7 (C) 13 (D) -13
6	If n is a negative integer. Then $n\,!$ is
	(A) 1 (B) Not defined (C) Zero (D) n
7	Number of ways of writing the letters of the " WORD " taken all at a time.
	(A) 24 (B) 4 (C) 6 (D) 25
8	Francesco Maurolico devised the method of
	(A) Partial fraction (B) Logarithm (C) Induction (D) Binomial expansion
9	The middle term in the expansion of $(x - y)^{12}$ is
	(A) 5th (B) 6th (C) 8th (D) 7th
10	One radian is equal to
	(A) $57.296°$ (B) $57°$ (C) $56°$ (D) $0.01875°$
11	$\sin 8\theta - \sin 4\theta$ = _____
	(A) $2 \sin 6\theta \sin 4\theta$ (B) $2 \cos 2\theta \sin 6\theta$ (C) $2 \cos 6\theta \sin 2\theta$ (D) $-2 \sin 6\theta \cos 2\theta$
12	Period of $\tan \frac{x}{3}$ is
	(A) π (B) 2π (C) 3π (D) $\frac{\pi}{2}$
13	Radius of Escribed circle apposite to the vertex B is equal to
	(A) $\frac{\Delta}{s}$ (B) $\frac{\Delta}{s-c}$ (C) $\frac{\Delta}{s-a}$ (D) $\frac{\Delta}{s-b}$
14	With usual notation $\frac{abc}{4\Delta}$ is equal to
	(A) r (B) $2\,r$ (C) $\mathcal{R}$ (D) r_1
15	The domain of $y = \sin^{-1} x$ is
	(A) $-1 \le x < 1$ (B) $-1 < x < 1$ (C) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ (D) $-\frac{\pi}{2} < x < \frac{\pi}{2}$
16	If $\sin x = \cos x$ then x = _____
	(A) $30°$ (B) $45°$ (C) $0°$ (D) $60°$
17	$|a + ib|$ is equal to
	(A) $a^2 + b^2$ (B) $\sqrt{a^2 + b^2}$ (C) $a^2 - b^2$ (D) $\sqrt{a^2 - b^2}$
18	If A^c is complement of set A. Then $A \cap A^c$ = _____
	(A) A (B) A^c (C) $\cup$ (D) $\emptyset$
19	If a system of linear equation has a unique solution or infinitely many solutions. Then it can be known as
	(A) Consistent System (B) Inconsistent System (C) Non linear System (D) Unique System
20	Transpose of Matrix $A = \left[a_{ij}\right]_{m \times n}$ is equal to
	(A) $\left[a_{ij}\right]_{m \times m}$ (B) $\left[a_{ij}\right]_{m \times n}$ (C) $\left[a_{ij}\right]_{n \times m}$ (D) $\left[a_{ij}\right]_{n \times n}$

MATHEMATICS **SUBJECTIVE** **TIME : 2.30 HOURS**
GROUP : SECOND **SECTION-I** DGK-11-2-23 **MARKS : 80**

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

i	Whether closed or not with respect to addition and multiplication is $\{1\}$
ii	Simplify $(-1)^{-21}$
iii	Write down power set of $\{\emptyset\}$
iv	Verify De – Morgan's laws for sets $\cup = \{1,2,3,\ldots,20\}$ $A = \{2,4,6,\ldots,20\}$, $B = \{1,3,5,\ldots,19\}$
v	Construct truth table for statement $(p \wedge \sim p) \to q$
vi	If $A = \begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$ show that $A^4 = I_2$
vii	Without expansion show that $\begin{vmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{vmatrix} = 0$
viii	Define Hermitian Matrix
ix	Evaluate $\left(-1 + \sqrt{-3}\right)^5 + \left(-1 - \sqrt{3}\right)^5$
x	When the polynomial $x^3 + 2x^2 + kx + 4$ is divided by $x - 2$, remainder is 14. Find the value of 'x'
xi	Solve the system of equations $x + y = 5$, $\frac{2}{x} + \frac{3}{y} = 2$, $x \neq 0$, $y \neq 0$
xii	Sum of positive number and its square is 380. Find the number.

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

i	Define improper rational fraction and give one example.
ii	Determine whether 2 is a term of the A.P $17,13,9,\ldots\ldots$
iii	If 5, 8 are two A.Ms between " a " and " b ", find a and b
iv	Sum the series $(x - a) + (x + a) + (x + 3a) + \ldots\ldots$ to n terms
v	Find the 5th term of the G.P : $3 , 6 , 12 ,\ldots\ldots$
vi	If the numbers $\frac{1}{k}$, $\frac{1}{2k+1}$ amd $\frac{1}{4k-1}$ are in harmonic sequence, find k.
vii	Find the value of n when $^np_2 = 30$
viii	How many arrangements of the letters of word PAKISTAN , taken all together, can be made.
ix	What is the probability that a slip of numbers divisible by 4 is picked from the slips bearing numbers $1,2,3,\ldots\ldots,10$?
x	Prove that $n! > n^2$ for $n = 4,5$
xi	Find the term independent of x in the expansion of $\left(x - \frac{2}{x}\right)^{10}$
xii	Expand upto 3 terms $(4 - 3x)^{1/2}$

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

i	What is the circular measure of the angle between the hands of a watch at 4 O' Clock ?
ii	Find the value of $\sin\theta$ and $\cos\theta$ if $\tan\theta = -\frac{1}{3}$ and the terminal arm of the angle is in quadrant II
iii	Prove that $\operatorname{Sec}^2 A + \operatorname{Cosec}^2 A = \operatorname{Sec}^2 A \ \operatorname{Cosec}^2 A$ (Where $A \neq \frac{n\pi}{2}, n \in Z$)
iv	Prove that $\sin(180^\circ + \alpha) \sin(90^\circ - \alpha) = -\sin\alpha \cos\alpha$
v	Find the value of $\tan 105^\circ$
vi	Express $\cos(2x + 30^\circ) \cos(2x - 30^\circ)$ as sum or differences.
vii	Find the period of $3\cos\frac{x}{5}$
viii	Solve the triangle ABC if $\beta = 60^\circ$, $\gamma = 15^\circ$, $b = \sqrt{6}$
ix	Find the area of the triangle ABC $b = 37$, $c = 45$, $\alpha = 30^\circ 50'$
x	Prove that $\mathcal{R} = \frac{abc}{4\Delta}$
xi	Find the value of $\sec\left[\sin^{-1}\left(-\frac{1}{2}\right)\right]$
xii	Find the solution of equation which lies in $[0, 2\pi]$ $\sec x = -2$
xiii	Find the value of θ satisfying the following equation $2\sin^2\theta - \sin\theta = 0$, $\theta \in [0, 2\pi]$

P.T.O

Note: **Attempt any Three questions from this section**   DGK-11-2-23 $10 \times 3 = 30$

Q. 5-(A)	Show that $\begin{vmatrix} x & 1 & 1 & 1 \\ 1 & x & 1 & 1 \\ 1 & 1 & x & 1 \\ 1 & 1 & 1 & x \end{vmatrix} = (x+3)(x-1)^3$	
(B)	Solve the equation simultaneously $\sqrt{x^2 + x + 1} - \sqrt{x^2 + x - 1} = 1$	
Q. 6 -(A)	Resolve $\dfrac{x^2 + x - 1}{(x+2)^3}$ into partial fraction	
(B)	There are 20 chits marked 1,2,3,........, 20 in a bag. Find the probability of picking a chit, the number written on which is a multiple of 4 or a multiple of 7	
Q. 7-(A)	If ℓ, m, n are the pth, qth and rth terms of A.P, show that $\ell(q - r) + m(r - p) + n(p - q) = 0$	
(B)	Find the term involving x^5 in the expansion of $\left(\dfrac{3x}{2} - \dfrac{1}{3x}\right)^{11}$	
Q. 8 -(A)	If $\csc \theta = \dfrac{m^2 + 1}{2m}$ and $m > 0 \left(0 < \theta < \dfrac{\pi}{2}\right)$, find the values of the remaining trigonometric ratios.	
(B)	If α, β, γ are angles of $\triangle ABC$, prove that $\tan \alpha + \tan \beta + \tan \gamma = \tan \gamma \tan \beta \tan \alpha$	
Q. 9 -(A)	Prove that $r_1 r_2 + r_2 r_3 + r_3 r_1 = s^2$	
(B)	Prove that $\sin^{-1} \dfrac{5}{13} + \sin^{-1} \dfrac{7}{25} = \cos^{-1} \dfrac{253}{325}$	

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