**PAPER CODE - 6191**
**11th CLASS – 12021**

**MATHEMATICS , GROUP FIRST** D44-91-21 **TIME: 30 MINUTES , 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 mark in that question.

**QUESTION NO. 1**

(1) Multiplicative identity in complex numbers is
(A) (0,0) (B) (0,1) (C) (1,1) (D) (1,0)

(2) Set $\{1 , w , w^2\}$ is closed w.r.t
(A) Addition (+) (B) Multiplication (×) (C) Both A and B (D) Division (÷)

(3) Let A be not a square matrix , then $|A^t| =$
(A) $A^{-1}$ (B) $|A|^t$ (C) $|A|$ (D) Not defined

(4) If A is a matrix of order $3\times1$ , then the order of $AA^t$ is
(A) $1\times3$ (B) $1\times1$ (C) $3\times3$ (D) $3\times1$

(5) If $x^{1/4} = -2$ then x =
(A) 8 (B) - 8 (C) 16 (D) - 16

(6) Remainder is = 11 if $x^2 + 3x + 7$ is divided by
(A) x+1 (B) x+2 (C) x+3 (D) x-1

(7) The number of co-efficients in the partial fraction of $\frac{1}{(x-1)^2(x^2+16)}$ are
(A) 2 (B) 3 (C) 4 (D) 5

(8) $26^{th}$ term of $a_n = (-1)^{n+1}$ is
(A) 1 (B) -1 (C) 26 (D) - 26

(9) Relation between A , G , H , is
(A) A > G > H (B) A < G < H (C) Both A and B (D) A > G < H

(10) Reciprocal of the sequence 1/3 , 1/5 , 1/7 , ..... forms
(A) Geomatric sequence (B) Arithmatic sequence (C) Harmonic sequence (D) Null sequence

(11) ${}^{n+1}C_r + {}^{n+1}C_{r-1} =$
(A) ${}^{n+1}C_r$ (B) ${}^{n+2}C_{r-1}$ (C) ${}^{n+1}C_{r+1}$ (D) ${}^{n+2}C_r$

(12) In the middle term $T_{r+1}$ of the binomial expansion of $(a+b)^{12}$ , $\gamma =$
(A) 6 (B) 7 (C) 5 (D) 12

(13) Which of the following is quadrental Angle
(A) $350^\circ$ (B) $-390^\circ$ (C) $-360^\circ$ (D) $410^\circ$

(14) $\frac{-9\pi}{2}$ coincides with
(A) OX (B) OY (C) OX′ (D) OY′

(15) $\sin(-300^\circ) =$
(A) $\frac{-\sqrt{3}}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{1}{\sqrt{2}}$

(16) The period of $3\sin\frac{x}{3}$ is
(A) $6\pi$ (B) $2\pi$ (C) $3\pi$ (D) $4\pi$

(17) The radius of inscribed circle is
(A) $\frac{abc}{4\Delta}$ (B) $\frac{\Delta}{S}$ (C) $\frac{\Delta}{S-a}$ (D) $\frac{\Delta}{S-b}$

(18) $\frac{c^2 \sin\propto \sin\beta}{\sin\gamma} =$
(A) $\Delta$ (B) $\frac{\Delta}{2}$ (C) $2\Delta$ (D) $\Delta S$

(19) $\cos(\tan^{-1}(0)) =$
(A) 0 (B) - 1 (C) 1 (D) $\infty$

(20) If $\cos x = 0$ then number of solutions are
(A) 2 (B) 4 (C) 6 (D) Infinite

**MATHEMATICS**
**GROUP : FIRST**

**11th CLASS – 12021**
**SUBJECTIVE**
**SECTION-I** D&K-G1-21

**TIME : 2.30 HOURS**
**MARKS : 80**

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

| | |
|---|---|
| 1 | Check the closure property in the set {0 , -1} w.r.t addition and multiplication |
| 2 | Find the multiplicative inverse of the number $(\sqrt{2}, -\sqrt{5})$ |
| 3 | If Z is any complex number , then prove that $Z\bar{Z} = \|Z\|^2$ |
| 4 | Write the descriptive form and tabular form of the set $\{x \mid x \in O \wedge 5 \leq x \leq 7\}$ |
| 5 | Show that the statement $(p \wedge q) \rightarrow P$ is a tautology |
| 6 | Show that the set of natural numbers N is non-commutative and non-associative w.r.t subtraction |
| 7 | Find the values of x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$ |
| 8 | Find the matrix X , if $X \begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$ |
| 9 | Find the value of $\lambda$ if matrix $A = \begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is singular |
| 10 | Find the roots of the equation $5x^2 - 13x + 6 = 0$ |
| 11 | Find four fourth roots of unity |
| 12 | When the polynomial $x^4+2x^3+kx^2+3$ is divided by $x - 2$ , the remainder is 1. Find the value of k |

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

| | |
|---|---|
| 1 | Resolve $\frac{9}{(x+2)^2(x-1)}$ into partial fraction without finding the constants A,B and C |
| 2 | Resolve $\frac{3x+7}{(x^2+4)(x+3)}$ into partial fraction without finding the constants A,B and C. |
| 3 | Which term of the A.P -2 , 4 , 10 ..... is 148 ? |
| 4 | Find the 5th term of the G.P 3 , 6 , 12 , ..... |
| 5 | Find the sum of the infinite G.P 2 , $\sqrt{2}$ , 1 , ..... |
| 6 | Find A , G , H if $a = \frac{-2}{5}$ , $b = \frac{-8}{5}$ |
| 7 | Evaluate ${}^9P_8$ |
| 8 | How many arrangements of the letters of the word "ATTACKED" can be made if each arrangement begins with C and ends with K ? |
| 9 | Find the value of n when ${}^nC_{12} = {}^nC_6$ |
| 10 | Show that the inequality $4^n > 3^n + 4$ is true for n = 2 , 3 |
| 11 | Calculate $(9.98)^4$ by using binomial theorem. |
| 12 | Expand $(8-2x)^{-1}$ up to 4 terms by using binomial theorem |

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

| | |
|---|---|
| 1 | Express the sexagesimal measure of angle 120′40″ in radian |
| 2 | Verify $\sin 2\theta = 2\sin\theta \cos\theta$ , when $\theta = 30^\circ, 45^\circ$ |
| 3 | Prove that $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$ , where $\theta$ is not an odd multiple of $\frac{\pi}{2}$ |
| 4 | Without using the tables , Find the value of $\cot(-855^\circ)$ |
| 5 | Prove that $\frac{1-\tan\theta\tan\phi}{1+\tan\theta\tan\phi} = \frac{\cos(\theta+\phi)}{\cos(\theta-\phi)}$ |
| 6 | Express the difference $\sin 8\theta - \sin 4\theta$ as product |
| 7 | Find the period of $3\cos\frac{x}{5}$ |
| 8 | A vertical pole is 8m high and length of its shadow is 6m .What is the angle of elevation of the sun at that moment? |
| 9 | Find the smallest angle of the triangle ABC , when a = 37.34 , b = 3.24 , c = 35.06 |
| 10 | Find the area of a triangle ABC , when b = 37 , c = 45 , $\alpha = 30^\circ 50'$ |
| 11 | Without using tables/calculator , Find $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ |
| 12 | Find the solution of $\sin x = -\frac{\sqrt{3}}{2}$ which lie in $[0 , 2\pi]$ |
| 13 | Solve the trigonometric equation $\tan^2\theta = \frac{1}{3}$ in $[0 , 2\pi]$ |



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DGK-G1-21

## SECTION-II

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

| | |
|---|---|
| Q. 5-(A) | Use Cramer's rule to solve $3x_1 + x_2 - x_3 = -4$, $x_1 + x_2 - 2x_3 = -4$, $-x_1 + 2x_2 - x_3 = 1$ |
| (B) | Show that the roots of $x^2 + (mx + c)^2 = a^2$ will be equal if $c^2 = a^2(1 + m^2)$ |
| Q. 6 -(A) | Resolve into partial fraction $\frac{x^2+1}{x^3+1}$ |
| (B) | For what value of n, $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$, is the positive geometric mean between a and b |
| Q. 7-(A) | How many numbers greater than 1000,000 can be formed from the digits 0 , 2 , 2 , 2 , 3 , 4 , 4 |
| (B) | Find the term independent of x in the expansion of $\left(x - \frac{2}{x}\right)^{10}$ |
| Q. 8 -(A) | Prove that : $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta \cos^2\theta)$ |
| (B) | If $\tan \propto = \frac{3}{4}$, $\cos \beta = \frac{5}{13}$ and neither the terminal side of the angle of measure $\propto$ nor that of $\beta$ is in the I quadrant , Find $\sin(\propto + \beta)$ |
| Q. 9 -(A) | Prove that in an equilateral triangle $r : R : r_1 = 1 : 2 : 3$ |
| (B) | Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$ |

D

**PAPER CODE - 6196**
**11th CLASS - 12021**

**MATHEMATICS**
**GROUP SECOND**

DGK-G2-21

**OBJECTIVE**

**TIME: 30 MINUTES**
**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 degree of P(x) is less than degree of Q(x) then rational fraction $\frac{P(x)}{Q(x)}$ is called
(A) Proper rational fraction (B) Improper rational fraction (C) Common fraction (D) Rational number

(2) Next term of the sequence 7 , 9 , 12 , 16 , ..... is
(A) 20 (B) 21 (C) 22 (D) 23

(3) A.M between $2+\sqrt{3}$ and $2-\sqrt{3}$ is
(A) 4 (B) $\sqrt{3}$ (C) 2 (D) $2\sqrt{3}$

(4) No term of a Harmonic sequence can be
(A) 1 (B) - 1 (C) 2 (D) 0

(5) Factorial of 0 i.e 0! is equal to
(A) 2 (B) 0 (C) Does not exists (D) 1

(6) The number of terms in the binomial expansion $(a+x)^6$ are
(A) 7 (B) 6 (C) 5 (D) 4

(7) $60^{th}$ part of a minute is called
(A) Second (B) Minute (C) Degree (D) Hour

(8) $\frac{1}{2}$ Rotation in clock wise direction equals to
(A) $180^o$ (B) $-180^o$ (C) $90^o$ (D) $-90^o$

(9) $\sin\left(\frac{\pi}{2}+\propto\right)$ equals to
(A) $-\cos\propto$ (B) $\sin\propto$ (C) $\cos\propto$ (D) $-\sin\propto$

(10) Period of Secant Function is
(A) $\pi$ (B) $3\pi$ (C) $4\pi$ (D) $2\pi$

(11) In any triangle ABC with usual notations $\frac{b^2+c^2-a^2}{2bc}$ equals to
(A) $\cos\beta$ (B) $\cos\propto$ (C) $\sin\beta$ (D) $\sin\propto$

(12) If the sides of a triangle are 18 , 24 , 30 then the value of S is
(A) 36 (B) 72 (C ) 144 (D) 24

(13) The function $y = \cos x$ is called principal cosine if
(A) $\frac{-\pi}{2} \le x \le \frac{\pi}{2}$ (B) $\frac{-\pi}{2} < x < \frac{\pi}{2}$ (C) $0 \le x \le \pi$ (D) $0 < x < \pi$

(14) If $\sin x = \frac{-1}{\sqrt{2}}$ then the reference angle is
(A) $\frac{\pi}{3}$ (B) $\frac{-\pi}{4}$ (C) $\frac{-\pi}{3}$ (D) $\frac{\pi}{4}$

(15) " 0 " is
(A) Irrational number (B) Positive integer (C) Rational number (D) Negative integer

(16) The set $\{x \mid x \in R \wedge x \neq x\}$ is
(A) Empty set (B) Infinite set (C) Singleton set (D) Binary set

(17) Which of the following has no inverse ?
(A) Identity matrix (B) Singular matrix (C) Diagonal matrix (D) Non singular matrix

(18) If order of the matrix A is $m\times n$ and order of B is $n\times P$ then order of AB is equal to
(A) $P\times m$ (B) $m\times m$ (C) $n\times n$ (D) $m\times P$

(19) If 1 , w , $w^2$ are cube roots of unity then $w + w^2 =$
(A) 1 (B) w (C) – 1 (D) 0

(20) The degree of the polynomial $ox^{15} + x^{14} + x^{12} + 5$ is
(A) 15 (B) 14 (C) 12 (D) 5

**MATHEMATICS** | **11th CLASS – 12021** | **TIME : 2.30 HOURS**
**GROUP : SECOND** | **SUBJECTIVE** | **MARKS : 80**
**SECTION-I** DGK-G2-21

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

| | |
|---|---|
| 1 | Prove that $\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c}$ |
| 2 | Simplify $(2, 6)(3, 7)$ |
| 3 | Factorize $a^2+4b^2$ |
| 4 | Verify the commutative property of union if $A=\{1, 2, 3, 4, 5\}$ ; $B=\{4, 6, 8, 10\}$ |
| 5 | Write two proper subsets of $\{a, b, c\}$ |
| 6 | Find the inverse of the relation $\{(1, 3), (2, 5), (3, 7), (4, 9), (5, 11)\}$ |
| 7 | Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix}=\begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$ |
| 8 | If $A=\begin{bmatrix} 2 & -1 & 3 & 0 \\ 1 & 0 & 4 & -2 \\ -3 & 5 & 2 & -1 \end{bmatrix}$ then find $AA^t$ |
| 9 | If $A=\begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$ Show that $A+(\overline{A})^t$ is hermitian |
| 10 | Solve $x^2+7x+12=0$ by factorization |
| 11 | Show that $x^3-y^3=(x-y)(x-wy)(x-w^2y)$ |
| 12 | Show that the roots of the equation $(P+q)x^2-Px-q=0$ will be rational |

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

| | |
|---|---|
| 1 | Resolve into partial fraction $\frac{x^2+x-1}{(x+2)^3}$ without finding values of unknown constants |
| 2 | Resolve $\frac{7x+25}{(x+3)(x+4)}$ into partial fraction |
| 3 | Find the next two terms of $1, 3, 7, 15, 31, \ldots\ldots\ldots\ldots$ |
| 4 | Find the Arithmetic Mean (A.M) between $x-3$ and $x+5$ |
| 5 | Find the sum of Geometric progression $2, \sqrt{2}, 1, \ldots\ldots\ldots\ldots$ |
| 6 | Find the $12^{th}$ term of $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \ldots\ldots\ldots\ldots$ |
| 7 | Find the value of n , when ${}^{11}P_n = 11.10.9$ |
| 8 | What is the probability that a slip of a number divisible by 4 is picked from the slips bearing numbers $1, 2, 3, \ldots\ldots\ldots 10$ ? |
| 9 | A dic is thrown twice, what is the probability that the sum of the numbers of dots shown 3 or 11 |
| 10 | Evaluate $\sqrt[3]{30}$ correct to three decimal |
| 11 | Use mathematical induction to prove that $1+5+9+\ldots\ldots+(4n-3)=n(2n-1)$ is true for $n=1$ and $n=2$ |
| 12 | Determine the middle term of the expansion $\left(\frac{1}{x}-\frac{x^2}{2}\right)^{12}$ |

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

| | |
|---|---|
| 1 | Find the value of $\sin\theta$ and $\cos\theta$ if $\theta=\frac{-9\pi}{2}$ |
| 2 | Prove that $\sqrt{\frac{1-\sin\theta}{1+\sin\theta}}=\sec\theta-\tan\theta$ , where $\theta$ is not an odd multiple of $\frac{\pi}{2}$ |
| 3 | Convert $54^\circ 45'$ into radian |
| 4 | Prove that $\sin\left(\frac{\pi}{4}-\theta\right)\sin\left(\frac{\pi}{4}+\theta\right)=\frac{1}{2}\cos 2\theta$ |
| 5 | Prove that $\cot\propto-\tan\propto=2\cot 2\propto$ |
| 6 | Without using calculator , prove that $\cos 330^\circ \sin 600^\circ+\cos 120^\circ \sin 150^\circ=-1$ |
| 7 | Find the period of $\cos 2x$ |
| 8 | The area of triangle is 121.34 . If $\propto=32^\circ 15'$ , $\beta=65^\circ 37'$ , then find c and angle $\gamma$ |
| 9 | Prove that $\frac{1}{r^2}+\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2}=\frac{a^2+b^2+c^2}{\Delta^2}$ |
| 10 | Solve the right triangle ABC in which $\gamma=90^\circ$ and $\propto=62^\circ 40'$ , $b=796$ |
| 11 | Show that $\sin^{-1}(-x)=-\sin^{-1}x$ |
| 12 | Solve the equation $\cot\theta=\frac{-1}{\sqrt{3}}$ , $\theta\in[0, 2\pi]$ |

## SECTION-II

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

| | |
|---|---|
| Q. 5-(A) | Find the rank of matrix $\begin{bmatrix} 1 & -4 & -7 \\ 2 & -5 & 1 \\ 1 & -2 & 3 \\ 3 & -7 & 4 \end{bmatrix}$ |
| (B) | Prove that $\frac{x^2}{a^2} + \frac{(mx+c)^2}{b^2} = 1$ will have equal roots if $c^2 = a^2m^2 + b^2$ , $a \neq 0$ , $b \neq 0$ |
| Q. 6 -(A) | Resolve into partial fractions $\frac{9}{(x+2)^2(x-1)}$ |
| (B) | Find four numbers in A.P. whose sum is 32 and sum of whose squares is 276 |
| Q. 7-(A) | A natural number is chosen out of the first fifty natural numbers. What is the probability that the chosen number is a multiple of 3 or of 5 |
| (B) | Use mathematical induction to prove that $1^3 + 3^3 + 5^3 + \ldots\ldots + (2n-1)^3 = n^2(2n^2 - 1)$ is true for every positive integer ' n ' |
| Q. 8 -(A) | Find the values of all trigonometric functions of the angle $\theta = \frac{-17\pi}{3}$ |
| (B) | Prove without using calculator $\sin 19^\circ \cos 11^\circ + \sin 71^\circ \sin 11^\circ = \frac{1}{2}$ |
| Q. 9 -(A) | Prove that $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$ |
| (B) | Solve the triangle ABC in which $a = \sqrt{3} - 1$ , $b = \sqrt{3} + 1$ and $\gamma = 60^\circ$ |