DGK-G1-11-18

PAPER CODE - 6191
(11th CLASS - 12018)

MATHEMATICS , GROUP FIRST

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) The number π is
(A) a whole number (B) a natural number (C) a rational number (D) an irrational number

(2) The number of ways in which a set can be described are
(A) 1 (B) 2 (C) 3 (D) 4

(3) If A and B are matrices , then $(AB)^t$ =
(A) B^tA^t (B) A^tB^t (C) AB (D) BA

(4) Rank of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is
(A) 1 (B) 2 (C) 3 (D) 4

(5) The roots of the equation $ax^2+bx+c = 0$ will be imaginary if
(A) $b^2 - 4ac = 0$ (B) $b^2 - 4ac > 0$ (C) $b^2 - 4ac < 0$ (D) $b^2 - 4ac = 1$

(6) If $b^2 - 4ac > 0$ and perfect square then roots are
(A) Rational (B) Irrational (C) Equal (D) Complex

(7) The fractions $\frac{x-3}{x+1}$ is
(A) Improper (B) Proper (C) Identity (D) Equivalent

(8) A geometric mean (G.M) between " a " and " b " is
(A) $\frac{a+b}{2}$ (B) $\frac{2}{a+b}$ (C) $\sqrt{ab}$ (D) $\frac{2ab}{a+b}$

(9) The formula for the sum of n terms of an A.P is
(A) $\frac{n}{2}\{2a+(n+1)d\}$ (B) $\frac{n}{2}\{a+(n-1)d\}$ (C) $\frac{n}{2}\{2a+(n-1)d\}$ (D) $\frac{n}{2}\{a-(n-1)d\}$

(10) From a box containing 5 green and 3 red balls , one ball is taken out. The probability that the ball drawn is black is
(A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{8}$ (D) 0

(11) Value of $\frac{9!}{6!\,3!}$ is
(A) 84 (B) 48 (C) 24 (D) 42

(12) Expansion of $(1+2x)^{1/5}$ is valid if
(A) $|x| < 1$ (B) $|x| < 2$ (C) $|x| < \frac{1}{2}$ (D) $|x| \leq 1$

(13) The expression $n^2 - n + 41$ represents a prime number for $n \in N$ where
(A) $n \leq 10$ (B) $n \leq 20$ (C) $n \leq 40$ (D) $n \leq 5$

(14) If $\sin\theta = \frac{1}{2}$ then θ is equal to
(A) 30° (B) 45° (C) 60° (D) 90°

(15) $\cos 2\theta$ is equal to
(A) $\frac{2\tan\theta}{1-\tan^2\theta}$ (B) $\frac{2\tan\theta}{1+\tan^2\theta}$ (C) $\frac{1-\tan^2\theta}{1+\tan^2\theta}$ (D) $2\cos^2\theta + 1$

(16) The smallest positive integer p for which $f(p+x) = f(x)$ is called
(A) Domain (B) Range (C) Co-Domain (D) Period

(17) With usual notation in triangle Δ ABC , If $a = 7$, $b = 3$, $c = 5$ then value of ' S ' is equal to
(A) 15 (B) $\frac{15}{2}$ (C) 55 (D) 105

(18) If Δ ABC is right anlge triangle , the law of cosine reduces to the
(A) Law of Sine (B) Area of triangle (C) Law of tangent (D) Pythagoras theorem

(19) The value of $\frac{\pi}{2} - \sin^{-1} x$ is equal to
(A) $\cos^{-1} x$ (B) $\sin^{-1}x$ (C) $\cos x$ (D) $\sin x$

(20) An equation containing at least one trigonometric function is called
(A) algebraic equation (B) quadratic equation (C) linear equation (D) trigonometric equation

MATHEMATICS
GROUP FIRST

11th CLASS - 12018)
SUBJECTIVE
SECTION-I

TIME : 2.30 HOURS
MARKS : 80

DGK-G1-11-18

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

1	Check the closure property of addition and multiplication for the set {0 , -1}
2	If Z_1 and Z_2 are complex numbers then show that $\overline{Z_1 Z_2} = \overline{Z_1}\,\overline{Z_2}$
3	Express the complex number $(1+i\sqrt{3})$ in the polar form
4	If A = {1 , 2 , 3} then find the power set of A
5	Define tautology and absurdity
6	Define Group
7	If $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$ then find A^{-1}
8	Define cofactor of an element of a matrix and give an example
9	Without expansion show that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$
10	Find the condition when one root of $x^2 + px + q = 0$ is double the other
11	Show that the roots of $px^2 - (p-q)x - q = 0$ are rational
12	If w is the cube root of unity then show that $x^3+y^3 = (x+y)(x+wy)(x+w^2y)$

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

1	Define partial fraction ; Give example
2	If $\frac{1}{a}$, $\frac{1}{b}$ and $\frac{1}{c}$ are in A.P. Show that common difference is $\frac{a-c}{2ac}$
3	Insert two G.M's. between 1 and 8
4	If the numbers $\frac{1}{k}$, $\frac{1}{2k+1}$ and $\frac{1}{4k-1}$ are in H.P. find k
5	If H.M. and A.M. between two numbers are 4 and $\frac{9}{2}$ respectively , find the number
6	Find the sum of first 15 terms of the geometric sequence $1 , \frac{1}{3} , \frac{1}{9} , \ldots\ldots\ldots\ldots$
7	Find the value of n when $^{n}P_{n} = 11.10.9$ P is permotation
8	Find the number of diagonals of a 6 – sided figure
9	In how many ways 4 keys can be arranged on a circular key ring?
10	Verify that : the inequality for 4 , 5 . $n! > n^2$ for n = 4,5
11	Expand $(3a - \frac{x}{3a})^4$ up to 2 terms by Binomial theorem
12	Find the value of $3\sqrt{65}$ to ' 2 ' places of decimal by using Binomial series

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

1	Find value of r in a circle , when : $\ell = 56$ cm , $\theta = 45^\circ$
2	When $\theta = \frac{-9}{2}\pi$, with the help of general angle , find values of sin θ and cos θ
3	Prove that : $\frac{2\tan\theta}{1+\tan^2\theta} = 2\sin\theta\cos\theta$
4	Prove that : $\cos(\alpha + 45^\circ) = \frac{1}{\sqrt{2}}(\cos\alpha - \sin\alpha)$
5	Express sin 5x + sin 7x as a product
6	Prove that $\sqrt{\frac{1+\sin\alpha}{1-\sin\alpha}} = \frac{\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}}{\sin\frac{\alpha}{2}-\cos\frac{\alpha}{2}}$
7	Find the period of $\sin\frac{x}{3}$
8	When the angle between the ground and the sun is 30° , flag pole casts a shadow of 40m long. Find the height of the top of the flag
9	Find the smallest angle of the triangle Δ ABC , when a = 37.34 , b = 3.24 , c = 35.06
10	Find the area of the triangle Δ ABC having its two sides and the included angle as : b = 37 , c = 45 , $\alpha = 30^\circ 50'$
11	Show that $\sin(2\cos^{-1}x) = 2x\sqrt{1-x^2}$
12	Define general trigonometric equation
13	Using reference angle find the solutions (roots) of $\sin x = \frac{-\sqrt{3}}{2}$, $x \in [0 , 2\pi]$

(P.T.O)

DGK-G1-11-18

SECTION-II

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

5-(A)	Give the logical proof of De, Morgan,s laws
(B)	Prove that $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$
6-(A)	Solve $\frac{a}{ax-1} + \frac{b}{bx-1} = a+b$; $x \neq 1/a$ and $x \neq 1/b$
(B)	Split $\frac{7x+25}{(x+3)(x+4)}$ into partial fractions form
7-(A)	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"
(B)	Identify the series as binomial expansion also find the sum of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \ldots\ldots\ldots\ldots$
8-(A)	Prove that : $\sin^6\theta - \cos^6\theta = (\sin^2\theta - \cos^2\theta)(1 - \sin^2\theta\cos^2\theta)$
(B)	Prove that : $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$ (without using calculator)
9-(A)	Prove that $R = \frac{abc}{4\Delta}$ where a , b , c are the lengths of the sides of triangle and " Δ " denotes the area of triangle
(B)	Prove that (i) $\tan^{-1}\frac{120}{199} = 2\cos^{-1}\frac{12}{13}$
	(ii) $\sin^{-1}\frac{5}{13} + \sin^{-1}\frac{7}{25} = \cos^{-1}\frac{253}{325}$

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DGK-G2-11-18

MATHEMATICS , GROUP SECOND

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 inverse of complex number (0,-1) is
(A) (-1,0) (B) (0,1) (C) (1,0) (D) (0,-1)

(2) The contra-positive of $p \rightarrow q$ is
(A) $q \rightarrow p$ (B) $\sim q \rightarrow p$ (C) $q \rightarrow \sim p$ (D) $\sim q \rightarrow \sim p$

(3) If the matrix $\begin{bmatrix} \lambda & 1 \\ -2 & -1 \end{bmatrix}$ is singular then $\lambda =$
(A) 2 (B) 1 (C) -1 (D) - 2

(4) If matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 1 & -1 & 1 \end{bmatrix}$ then the cofactor $A_{32} =$
(A) 1 (B) 2 (C) -1 (D) -2

(5) The roots of equation $x^2+2x+3 = 0$ will be
(A) Complex (B) Equal (C) Rational (D) Irrational

(6) If w is the cube root of unity then $(1+w-w^2)^8 =$
(A) 256 (B) -256 (C) -256 w (D) 256 w

(7) The fraction $\frac{x^2-3}{3x+1}$ is
(A) Proper fraction (B) Improper fraction (C) Equation (D) Polynomial

(8) If $a_{n-2} = 3n-11$ then nth term is
(A) 3n+5 (B) 3n-3 (C) 3n-5 (D) 3n+2

(9) Arithmetic mean between $2+\sqrt{2}$ and $2-\sqrt{2}$ is
(A) 2 (B) 4 (C) $2\sqrt{2}$ (D) 0

(10) A die is rolled once then the probability of 3 or 4 dots on the top is
(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{6}$

(11) If in usual notations ${}^nC_6 = {}^nC_8$ then n is equal to
(A) 6 (B) 8 (C) 2 (D) 14

(12) The expansion of $(3-5x)^{1/2}$ is valid if
(A) $|x| < 5/2$ (B) $|x| < 5/3$ (C) $|x| < 1$ (D) $|x| < 3/5$

(13) In the expansion of $(1+x)^{-3}$ the 4th term is
(A) -3x (B) $-10x^3$ (C) $6x^2$ (D) $10x^3$

(14) If $\tan\theta = 8/15$ and $\pi \leq \theta \leq \frac{3\pi}{2}$ then $\cos\theta =$
(A) $-17/15$ (B) $17/15$ (C) $15/17$ (D) $-15/17$

(15) The value of $\cos 75^\circ =$
(A) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\frac{-\sqrt{3}+1}{2\sqrt{2}}$ (C) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (D) $\frac{-\sqrt{3}-1}{2\sqrt{2}}$

(16) The period of 3 sin x is
(A) 3π (B) π (C) 2π (D) $\pi/3$

(17) If $\propto = 90^\circ$ then by law of cosine
(A) $c^2 = a^2+b^2$ (B) $a^2 = b^2 + c^2$ (C) $b^2 = a^2 + c^2$ (D) $a^2 = b^2 - c^2$

(18) Radius of escribed circle opposite to vertex B in Δ ABC is
(A) $\frac{\Delta}{S}$ (B) $\frac{\Delta}{S-a}$ (C) $\frac{\Delta}{S-C}$ (D) $\frac{\Delta}{S-b}$

(19) Domain of principal sine function is
(A) $[0, \pi/2]$ (B) $[0, \pi]$ (C) $[-\pi/2, \pi/2]$ (D) $[0, 2\pi]$

(20) The solution of $\sin x + \cos x = 0$ in $[0, \pi]$ is
(A) $\frac{3\pi}{4}$ (B) $\pi/4$ (C) $\pi/6$ (D) $\pi/3$

MATHEMATICS
GROUP SECOND

11th CLASS - 12018)
SUBJECTIVE
SECTION-I

DGK-G2-11-18

TIME : 2.30 HOURS
MARKS : 80

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

1	Define terminating decimal ; Give one example
2	Find multiplicative inverse of (- 4 , 7)
3	Show that $\forall Z \in C$, $Z^2 + \overline{Z^2}$ is a real number
4	Write $\{x \mid x \in O \wedge 5 \leq x < 7\}$ in the descriptive and tabular form
5	Write converse , contra positive of $q \rightarrow p$
6	State Domain and range of relation $\{(x , y) \mid x+y > 5\}$ in A = {1,2,3,4}
7	If $B = \begin{bmatrix} 5 & -2 & 5 \\ 3 & -1 & 4 \\ -2 & 1 & -2 \end{bmatrix}$, find cofactor B_{21} and B_{22}
8	Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$
9	Without expansion show that $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$
10	Solve : $x^2 - x = 2$ by factorization
11	Find four fourth roots of 16
12	If α , β are roots of $3x^2 - 2x + 4 = 0$, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

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

1	Resolve $\frac{7x+25}{(x+3)(x+4)}$ into partial fractions
2	Write the first four terms of $a_n = \frac{n}{2n+1}$
3	Find the Arithmetic Mean (A.M) between x-3 and x+5
4	Sum up to 13-terms of the Arithmetic series $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + \ldots\ldots\ldots\ldots$
5	Find two Geometric mean between 1 and 8
6	Calculate the sum of 8-terms of the Geometric series $2+(1- i) + \frac{1}{i} + \ldots\ldots\ldots\ldots$
7	Evaluate $\frac{9!}{2!(9-2)!}$
8	Find the value of n , when (a) ${}^nC_5 = {}^nC_4$ and (b) ${}^nC_{10} = \frac{12\times11}{2!}$, (C stands for combination)
9	There are 5-green and 3-red balls in a box. What is the probability of getting a green ball
10	Use mathematical induction to verify the result for n = 1,2 $1+2+4+\ldots\ldots\ldots\ldots + 2^{n-1} = 2^n - 1$
11	Calculate $(2.02)^4$ by means of Binomial theorem
12	Expand up to 3-terms , taking the value of x such that the expansion is valid $(8-2x)^{-1}$

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

1	Find r if $\ell = 56$ cm , $\theta = 45^\circ$
2	Find x if $\tan^2 45^\circ - \cos^2 60^\circ = x \sin 45^\circ \cos 45^\circ \tan 60^\circ$
3	Prove $\cos^2\theta - \sin^2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$
4	Prove that $\cos 306^\circ + \cos 234^\circ + \cos 162^\circ + \cos 18^\circ = 0$
5	Prove $\tan(\frac{\pi}{4} - \theta) + \tan(\frac{3\pi}{4} + \theta) = 0$
6	Prove $\frac{1-\cos\alpha}{\sin\alpha} = \tan\frac{\alpha}{2}$
7	Find the period of $\tan\frac{x}{7}$
8	In the right triangle Δ ABC , $\alpha = 37^\circ 20'$, a = 243 , $\gamma = 90^\circ$, Find "β" and "C"
9	Find the area of a Δ ABC , in which a = 18 , b = 24 , c = 30
10	Prove that $R = \frac{abc}{4\Delta}$, with usual notations
11	Prove $\tan^{-1}A + \tan^{-1}B = \tan^{-1}\left(\frac{A+B}{1-AB}\right)$
12	Find the solutions of the equation sec x = -2 , $x \in [0 , 2\pi]$
13	Find the values of θ , satisfying the equation $3\tan^2\theta + 2\sqrt{3}\tan\theta + 1 = 0$

(P.T.O)

D.Gr-K

DGK-G2-11-18

SECTION-II

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

5-(A)	Give logical proof of $(A \cup B)' = A' \cap B'$ when A , B are two sets
(B)	Without expansion , Prove that $\begin{vmatrix} x & a+x & b+c \\ x & b+x & c+a \\ x & c+x & a+b \end{vmatrix} = 0$
6-(A)	Show that the roots of $(mx+c)^2 = 4ax$ will be equal if $c = \frac{a}{m}$
(B)	Resolve $\frac{x^2}{(x-2)(x-1)^2}$ into partial fractions
7-(A)	If S_2 , S_3 , S_5 are the sum of 2n , 3n , 5n terms of Arithmatic Progression (A.P) , Show that $S_5 = 5\,(S_3 - S_2)$
(B)	If $y = \frac{2}{5} + \frac{1.3}{2!}\left(\frac{2}{5}\right)^2 + \frac{1.3.5}{3!}\left(\frac{2}{5}\right)^3 + \ldots\ldots\ldots\ldots$ then prove that $y^2+2y-4=0$
8-(A)	If $\cot\theta = {}^{15}/_{8}$ and the terminal arm of the angle is not in quadrant-I , Find the values of $\cos\theta$ and $\operatorname{cosec}\theta$
(B)	Reduce $\sin^4\theta$ to an expression involving only function of multiples of θ , raised to the first power
9-(A)	Solve the triangle Δ ABC , using first law of tangent and then of law of sines : $a = 93$, $c = 101$ and $\beta = 80^\circ$
(B)	Prove that : $\sin^{-1}A - \sin^{-1}B = \sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$