Roll No LHR-G1-11-18 (To be filled in by the candidate)

MATHEMATICS **(Academic Sessions 2014 – 2016 to 2017 – 2019)**

Q.PAPER – I (Objective Type) 218-(INTER PART – I) Time Allowed : 30 Minutes

GROUP – I Maximum Marks : 20

PAPER CODE = 6191

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The set { 0 , 1 } is closed under :			
	(A) Addition	(B) Multiplication	(C) Division	(D) Subtraction
2	If A and B are two sets, then A – B = :			
	(A) $A \cup B^c$	(B) $(A \cup B)^c$	(C) $A \cap B^c$	(D) $(A \cap B)^c$
3	A square matrix A is skew symmetric if A^t = :			
	(A) –A	(B) A	(C) $\overline{A}$	(D) A^t
4	If order of a matrix A is m × n, then order of A^t is :			
	(A) m × n	(B) m × m	(C) n × m	(D) n × n
5	Sum of roots of quadratic equation $ax^2 + bx + c = 0$ is :			
	(A) $\frac{a}{b}$	(B) $\frac{b}{a}$	(C) $\frac{c}{a}$	(D) $-\frac{b}{a}$
6	Product of all fourth roots of unity is :			
	(A) – 1	(B) 0	(C) 1	(D) i
7	The fraction $\frac{3x^2+5}{x+1}$ is :			
	(A) Proper fraction	(B) Polynomial		
	(C) Partial fraction	(D) Improper fraction		
8	Geometric mean between – 2 and 8 is :			
	(A) 4	(B) ± 4	(C) 8	(D) ± 4i
9	The 10th term of $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, ----$ is :			
	(A) 30	(B) 28	(C) $\frac{1}{29}$	(D) $\frac{1}{32}$
10	The value of $\frac{4!}{0!}$ is :			
	(A) 24	(B) 4	(C) 0	(D) Infinity
11	If A and B are mutually exclusive events, then $P(A \cup B)$ = :			
	(A) P (A) ∪ P (B)	(B) P (A) + P (B)		
	(C) P (A ∩ B)	(D) P (A) – P (B)		

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1-12	$4^n > 3^n + 4$ is true for integral values of n = : (A) 1 (B) $n \leq 1$ (C) 0 (D) $n \geq 2$
13	The 2^{nd} term in expansion of $\left(1-\frac{1}{3}x\right)^{-1}$ is : (A) $\frac{1}{3}x$ (B) $-\frac{1}{3}x$ (C) $3x$ (D) $2x$
14	If $\sin\theta < 0$ and $\cot\theta > 0$, then θ lies in quadrant : (A) 1 (B) 2 (C) 3 (D) 4
15	If α, β, γ are angles of triangle then $\tan(\alpha+\beta)+\tan\gamma$ = : (A) 1 (B) 0 (C) 2 (D) -1
16	Period of $\cos\left(\frac{x}{2}\right)$ = : (A) 2π (B) $\frac{\pi}{2}$ (C) 3π (D) 4π
17	Radius of escribed circle opposite to vertex 'c' of the triangle is : (A) $\frac{\Delta}{s}$ (B) $\frac{\Delta}{s-a}$ (C) $\frac{\Delta}{s-c}$ (D) $\frac{\Delta}{s-b}$
18	The value escribed circle r_1 = : (A) $\frac{\Delta}{s-a}$ (B) $\frac{\Delta}{s-c}$ (C) $\frac{\Delta}{s}$ (D) $\frac{\Delta}{a}$
19	The value of $\cos\left(\tan^{-1} 0\right)$ = : (A) -1 (B) 1 (C) 0 (D) ∞
20	If $\cos x = -\frac{1}{2}$, then reference angle is : (A) $\frac{\pi}{6}$ (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

Roll No LHR-G1-11-18 (To be filled in by the candidate)

(Academic Sessions 2014 – 2016 to 2017 – 2019)

MATHEMATICS 218-(INTER PART – I) Time Allowed : 2.30 hours

PAPER – I (Essay Type) GROUP – I Maximum Marks : 80

SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) Simplify $(-1)^{-21}$

(ii) Express the complex number $(1+i\sqrt{3})$ in polar form.

(iii) Find the multiplicative inverse of $(-4, 7)$

(iv) Is there any set which has no proper subset? If so name that set.

(v) Write the converse and contrapositive of $\sim q \rightarrow \sim p$

(vi) For $A = \{1, 2, 3, 4\}$, find the relation in A for $R = \{(x, y) | x + y < 5\}$, also write the range of R.

(vii) If $A = \begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}, A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, find the values of a and b.

(viii) Find the multiplicative inverse of the matrix $\begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$

(ix) Show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix}$

(x) Solve the equation $x^4 - 6x^2 + 8 = 0$

(xi) Show that $x^3 - y^3 = (x - y)(x - \omega y)(x - \omega^2 y), \omega$ is complex cube root of unity.

(xii) If α, β are the roots of $3x^2 - 2x + 4 = 0$, then find the value of $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$

3. Write short answers to any EIGHT (8) questions : **16**

(i) Resolve $\frac{x^2+1}{(x+1)(x-1)}$ into partial fractions.

(ii) If $a_{n-2} = 3n - 11$, find the nth term of the sequence

(iii) If 5, 8 are two A.Ms between a and b, find a and b

(iv) Which term of the A.P. 5, 2 , – 1, ------- is – 85 ?

(v) Insert two G.Ms between 1 and 8.

(vi) If 5 is the harmonic mean between 2 and b, find b

(vii) Define fundamental principle of counting.

(viii) Find the number of the diagonals of a 6-sided figure.

(ix) What is probability that a slip of numbers divisible by 4 are picked from the slips bearing number 1, 2, 3, ----- 10?

(x) State the principle of mathematical induction.

(xi) If x is so small that its square and higher powers can be neglected, then show that $\frac{1-x}{\sqrt{1+x}} = 1 - \frac{3}{2}x$

(xii) Find the 6th term in the expansion of $\left(x^2 - \frac{3}{2x}\right)^{10}$

4. Write short answers to any NINE (9) questions : **18**

(i) An arc subtends an angle of 70° at the center of a circle and its length is 132 m. Find the radius of the circle.

(ii) Define coterminal angles.

(iii) Verify $\sin^2\frac{\pi}{6}+\sin^2\frac{\pi}{3}+\tan^2\frac{\pi}{4}=2$

(iv) If α,β,γ are angles of a triangle ΔABC, then prove that $\tan(\alpha+\beta)+\tan\gamma=0$

(v) Find the value of $\sin 105°$, without calculator.

(vi) Prove that $\cot\alpha-\tan\alpha=2\cot 2\alpha$

(vii) Write the domain of $y=\sin x$

(viii) A vertical pole is 8m high and the length of its shadow is 6m. What is the angle of elevation of the sun at that moment?

(ix) Find α and β in the triangle ΔABC in which $a=7$, $b=7$, $c=9$

(x) Find the area of the triangle ΔABC in which $a=200$, $b=120$, $\gamma=150^{\circ}$

(xi) Evaluate without using calculator $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

(xii) Solve the equation $2\sin x-1=0$

(xiii) Find the solution of the equation which lie in interval $[0,2\pi]$: $\sec x=-2$

SECTION – II

Note : Attempt any THREE questions.

5. (a) Consider the set $S=\{1,-1,i,-i\}$. Set up its multiplication table and show that the set S is an abelian group under multiplication. 5

(b) If $A=\begin{bmatrix}1&0&2\\0&2&1\\1&-1&1\end{bmatrix}$ then find A^{-1} by using adjoint of the matrix. 5

6. (a) Solve the system of equations : $x+y=a+b$; *and* $\frac{a}{x}+\frac{b}{y}=2$ 5

(b) Resolve $\frac{9x-7}{(x^2+1)(x+3)}$ into partial fractions. 5

7. (a) Find four numbers in arithmetic sequence (A.P.) whose sum is 32 and the sum of whose squares is 276. 5

(b) Use binomial series to show that $1+\frac{1}{4}+\frac{1\times3}{4\times8}+\frac{1\times3\times5}{4\times8\times12}+---=\sqrt{2}$ 5

8. (a) If $\operatorname{cosec}\theta=\frac{m^2+1}{2m}$ and $m>0\left(0<\theta<\frac{\pi}{2}\right)$, find the values of the all remaining trigonometric ratios. 5

(b) Prove that $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9}=\frac{3}{16}$ without using calculator. 5

9. (a) With usual notations, prove that $r_1=\frac{\Delta}{s}$ 5

(b) Prove that $\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{8}{17}=\sin^{-1}\frac{77}{85}$ 5