

1121 Warning:- Please write your Roll No. in the space provided and sign. Roll No-----  
(Inter Part - I) (Session 2017-19 to 2020-22) Sig. of Student -----

Mathematics (Objective)

Group II

Paper (I)

Time Allowed:- 30 minutes

PAPER CODE 2198

Maximum 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. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

SGD-42-21

Q. 1

1) Partial fraction of  $\frac{1}{(x+1)(x^2-1)}$  will be of the form

(A)  $\frac{A}{x+1} + \frac{Bx+C}{x^2-1}$

(B)  $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{(x+1)^2}$

(D)  $\frac{A}{x+1} + \frac{Bx+C}{x^2+1}$

2) Arithmetic mean between a and b is

(A)  $\frac{a-b}{2}$

(B)  $\pm\sqrt{ab}$

(C)  $\frac{2ab}{a+b}$

(D)  $\frac{a+b}{2}$

3) If  $a_n = (-1)^n (2n-3)$  Then  $a_5 =$

(A) 7

(B) -7

(C) 13

(D) -13

4) Multiplicative inverse of  $-i$  is

(A)  $i$

(B)  $-i$

(C) 1

(D) -1

5) Tabular form of  $\{x | x \in E \wedge 4 < x < 6\}$  is

(A)  $\{\}$

(B)  $\{4\}$

(C)  $\{6\}$

(D)  $\{4, 6\}$

6) If  $A = \begin{bmatrix} 1 & 2 & -2 \\ 0 & 0 & 6 \\ 6 & 7 & 4 \end{bmatrix}$  then  $A_{33} =$

(A) -1

(B) 1

(C) -2

(D) 0

7) A matrix of order  $l \times n$  is called

(A) Row matrix

(B) Column matrix

(C) Diagonal matrix

(D) Null matrix

8) If one root of equation  $x^2 + px + q = 0$  is additive inverse of other, then

(A)  $p = -1$

(B)  $p = 0$

(C)  $q = 1$

(D)  $q = 0$

9) If  $\omega$  is cube root of unity, then  $\omega + \omega^2 =$

(A) 0

(B) -1

(C) 1

(D)  $\frac{1}{\omega}$

P.T.O 1133A -- 1121 ALP -- 25000 (4)

10) In any Triangle ABC, with usual notation,  $\frac{b-c}{b+c} =$  **540-42-21**

- (A)  $\frac{\tan \frac{\beta-\gamma}{2}}{\tan \frac{\beta+\gamma}{2}}$  (B)  $\frac{\tan \frac{\beta+\gamma}{2}}{\tan \frac{\beta-\gamma}{2}}$  (C)  $\frac{\tan \frac{\alpha-\gamma}{2}}{\tan \frac{\alpha+\gamma}{2}}$  (D)  $\frac{\tan \frac{\alpha+\beta}{2}}{\tan \left( \frac{\alpha-\beta}{2} \right)}$

11) Value of  $\sec \left( \sin^{-1} \frac{\sqrt{3}}{2} \right) =$

- (A)  $\frac{1}{2}$  (B) 2 (C)  $\frac{\sqrt{3}}{2}$  (D)  $\frac{1}{\sqrt{2}}$

12) If  $\sin x = \cos x$  then  $x =$

- (A)  $45^\circ$  (B)  $30^\circ$  (C)  $0^\circ$  (D)  $60^\circ$

13) G.M between  $2i$  and  $8i$  equals

- (A)  $\pm 4$  (B)  $5i$  (C)  $-4$  (D)  $\pm 4i$

14) For independent events  $P(A \cap B) =$

- (A)  $P(A) + P(B)$  (B)  $P(A) - P(B)$  (C)  $P(A) \cdot P(B)$  (D)  $\frac{P(A)}{P(B)}$

15) Expansion of  $(1-2x)^{1/3}$  is valid, if

- (A)  $|x| < 1$  (B)  $|x| < \frac{1}{3}$  (C)  $|x| < 2$  (D)  $|x| < \frac{1}{2}$

16)  $\cot^2 \theta - \operatorname{cosec}^2 \theta =$

- (A) 1 (B) -1 (C) 0 (D) 2

17)  $\cos(-60^\circ) =$

- (A)  $\frac{1}{2}$  (B)  $-\frac{1}{2}$  (C)  $\frac{\sqrt{3}}{2}$  (D)  $-\frac{\sqrt{3}}{2}$

18)  $\cos 2\alpha =$

- (A)  $2\sin^2 \alpha - 1$  (B)  $2\cos^2 \alpha - 1$  (C)  $2\cos \frac{\alpha}{2} \sin \frac{\alpha}{2}$  (D)  $1 - 2\cos^2 \alpha$

19) Period of  $\cot 8x$  is

- (A)  $8\pi$  (B)  $\frac{\pi}{8}$  (C)  $\frac{\pi}{4}$  (D)  $\pi$

20)  $\cot \frac{\alpha}{2} =$

- (A)  $\sqrt{\frac{s(s-c)}{(s-b)(s-a)}}$  (B)  $\sqrt{\frac{s(s-a)}{(s-b)(s-c)}}$  (C)  $\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$  (D)  $\sqrt{\frac{s(s-a)}{(s-b)(s-c)}}$

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Mathematics (Subjective)

(Session 2017-19 to 2020-22)

Paper (I)

Time Allowed: 2.30 hours

(Inter Part - I) Group II

Maximum Marks: 80

Section ----- I

2. Answer briefly any Eight parts from the followings:-

8 × 2 = 16

540-42-21

- (i) Find the multiplicative inverse of  $(-4, 7)$  (ii) Show that  $\forall z_1, z_2 \in C, \overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$
- (iii) Find the difference of the complex numbers  $(8, 9)$  and  $(5, -6)$
- (iv) Show that the statement  $(p \wedge q) \rightarrow p$  is a tautology (v) If  $A = \{a, \{b, c\}\}$ , then find  $P(A)$ .
- (vi) Write the set builder notation of the set.  $\{0, \pm 1, \pm 2, \dots, \pm 1000\}$
- (vii) Find the matrix X if:  $X \begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$
- (viii) Show that  $\begin{vmatrix} a+l & a & a \\ a & a+l & a \\ a & a & a+l \end{vmatrix} = l^2(3a+l)$  (ix) If  $A = \begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$  is singular. Find the value of  $\lambda$
- (x) Evaluate  $(1 + \omega - \omega^2)^8$
- (xi) Find the roots of the equation:  $16x^2 + 8x + 1 = 0$  by using Quadratic formula.
- (xii) By using remainder theorem, find the remainder when the polynomial  $x^2 + 3x + 7$  is divided by  $x+1$

3. Answer briefly any Eight parts from the followings:-

8 × 2 = 16

- (i) Resolve into Partial Fractions,  $\frac{1}{x^2 - 1}$
- (ii) Write into Partial fractions without finding the constants  $\frac{9}{(x+2)^2(x-1)}$
- (iii) Find the indicated term of the following sequence  $1, -3, 5, -7, 9, -11, \dots, a_8$ .
- (iv) If the  $n$ th term of the A.P is  $3n-1$ , find arithmetic progression.
- (v) Find the 12th term of the geometric sequence  $1+i, 2i, -2+2i, \dots$
- (vi) If the numbers  $\frac{1}{k}, \frac{1}{2k+1}$  and  $\frac{1}{4k-1}$  are in harmonic sequence, find  $k$ .
- (vii) Evaluate  ${}^{16}P_4$ . (viii) In how many ways can a necklace of 8 beads of different colours be made?
- (ix) Find the value of  $n$ , when  ${}^nC_5 = {}^nC_4$  (x) Calculate by means of binomial theorem  $(0.97)^3$
- (xi) Expand up to 3 terms  $(1-x)^{1/2}$
- (xii) If  $x$  is so small that its square and higher powers be neglected, then show that  $\frac{\sqrt{4+x}}{(1-x)^3} \approx 2 + \frac{25}{4}x$



4. Answer briefly any Nine parts from the followings:-

9 × 2 = 18

- (i) Convert  $54^\circ 45'$  into radians
- (ii) Verify  $\sin^2\left(\frac{\pi}{6}\right) + \sin^2\left(\frac{\pi}{3}\right) + \tan^2\left(\frac{\pi}{4}\right) = 2$
- (iii) Prove that  $\cos^4 \theta - \sin^4 \theta - \cos^2 \theta - \sin^2 \theta \forall \theta \in R$ .
- (iv) Without using tables write down the value of  $\cos 315^\circ$
- (v) Prove that  $\tan(45^\circ + A) \tan(45^\circ - A) = 1$  (vi) Prove that  $\frac{\sin A + \sin 2A}{1 + \cos A + \cos 2A} = \tan A$
- (vii) Find the period of  $3 \cos\left(\frac{x}{5}\right)$  (viii) Find the value of  $\cot 89^\circ 9'$
- (ix) Find the area of  $\triangle ABC$  having  $a=200$ ,  $b=120$ ,  $\gamma=150^\circ$
- (x) In  $\triangle ABC$  if  $a=13$ ,  $b=14$ ,  $c=15$  find  $R$
- (xi) Show that  $\sin^{-1}(-x) = -\sin^{-1}(x)$  (xii) Solve the equation  $\sin x = \frac{1}{2}$
- (xiii) Find the solutions of  $\sin x = -\frac{\sqrt{3}}{2}$  which lie in  $[0, 2\pi]$

Section ----- II

Note: Attempt any three questions.

(10 × 3 = 30)

5. (a) Use cramer's rule to solve the system of Equations 
$$\begin{aligned} 3x_1 + x_2 - x_3 &= -4 \\ x_1 + x_2 - 2x_3 &= -4 \\ -x_1 + 2x_2 - x_3 &= 1 \end{aligned}$$
- (b) Use synthetic division to find the values of  $p$  and  $q$  if  $x+1$  and  $x-2$  are the factors of the polynomial  $x^3 + px^2 + qx + 6$
6. (a) Resolve into Partial fractions  $\frac{9x - 7}{(x^2 + 1)(x + 3)}$
- (b) If the (positive) Geometric Mean and Harmonic Mean between two numbers are 4 and  $\frac{16}{5}$ , find the numbers.
7. (a) Prove that  ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$
- (b) Find 6th term in the expansion of  $\left(x^2 - \frac{3}{2x}\right)^{10}$
8. (a) If  $\sin \theta = -\frac{1}{\sqrt{2}}$  and the terminal arm of angle is not in quad. III Find the values of remaining trigonometric functions.
- (b) Prove that  $\frac{2 \sin \theta \sin 2\theta}{\cos \theta + \cos 3\theta} = \tan 2\theta \tan \theta$
9. (a) Prove that  $r = 4R \sin \frac{\alpha}{2} \sin \frac{\beta}{2} \sin \frac{\gamma}{2}$  (b) Prove that  $2 \tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{7} = \frac{\pi}{4}$