Mathematics

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L.K.No - 817

Paper Code No. 6197

Paper I (Objective Type)

Inter - A - 2018

Time Allowed : 30 Minutes

Inter (Part - I)

Maximum Marks : 20

Session (2014 - 16) to (2017 - 19)

BWP-11-18

Note : Four possible choices A, B, C, D to each question are given. Which choice 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.

Q. (1) (1) What is the Multiplicative Inverse of $1 - 2i$: (A) $\frac{1+2i}{5}$ (B) $\frac{1-2i}{5}$ (C) $\frac{1+2i}{\sqrt{5}}$ (D) $\frac{1-2i}{\sqrt{5}}$

(2) A Square Matrix A is Skew-Symmetric if $(A)^t$ = : (A) A (B) -A (C) $\bar{A}$ (D) $-A^t$

(3) If A is a Matrix of Order 4 x 3, then number of elements in each column of A is : (A) 2 (B) 3 (C) 4 (D) 5

(4) How many inverse elements correspond to each element of a group : (A) At least one (B) Only One (C) Two (D) At least two

(5) The Roots of the Equation $x^2 + x + 2 = 0$ are : (A) Real, Equal (B) Real, Unequal (C) Equal (D) Imaginary

(6) The Sum $\sum_{K=1}^{n} 1$ = : (A) 1 (B) n (C) n^2 (D) n^3

(7) Partial Fractions of $\frac{x+4}{(x-1)(x^2+2)}$ will be : (A) $\frac{A}{x-1} + \frac{Bx+C}{x^2+2}$ (B) $\frac{A}{x-1} + \frac{B}{x^2+2}$ (C) $\frac{Ax}{x-1} + \frac{Bx+C}{x^2+2}$ (D) $\frac{A}{x-1} + \frac{Bx}{x^2+2}$

(8) If $3^x + 2^{2x} = 5^x$, then the value of x is : (A) 0 (B) 1 (C) 2 (D) 3

(9) The Geometric Means between -2i and 8i are : (A) ± 4 (B) ± 2 (C) $\pm 3i$ (D) $\pm 4i$

(10) If $n \notin z^+$ and $|x| < 1$, then the Expansion $1 + nx + \frac{n(n-1)}{2!}x^2 + \text{———}$ is : (A) Arithmetic Series (B) Geometric Series (C) Harmonic Series (D) Binomial Series

(11) The Non-Occurrence of an Event E is denoted by $\bar{E}$ and $P(\bar{E})$ is given by : (A) $P(\bar{E}) - 1$ (B) $1 - P(E)$ (C) $1 - P(\bar{E})$ (D) $P(E) - 1$

(12) If P(E) is the Probability of an Event E, then : (A) $0 < P(E) < 1$ (B) $0 > P(E) > 1$ (C) $0 \leq P(E) \leq 1$ (D) $0 \geqslant P(E) \geqslant 1$

(13) The 2nd term in the expansion $(1 + 2x)^{\frac{-1}{3}}$ is : (A) $\frac{-2}{3}x$ (B) $\frac{2}{3}x$ (C) $-6x$ (D) $\frac{x}{3}$

(14) Period of Sec 10x is : (A) $\frac{\pi}{2}$ (B) π (C) $\frac{\pi}{5}$ (D) 2π

(15) $\cos\left(\theta + \frac{3\pi}{2}\right)$ is equal to : (A) $-\sin\theta$ (B) $\sin\theta$ (C) $-\cos\theta$ (D) $\cos\theta$

(16) An Angle in the Standard Position whose terminal arm lies on the x-axis or on the y-axis is called : (A) Obtuse Angle (B) Acute Angle (C) Right Angle (D) Quadrantal Angle

(17) Radius of Escribed Circle opposite to Vertex C of the Triangle is : (A) $\frac{\Delta}{s}$ (B) $\frac{\Delta}{s-a}$ (C) $\frac{\Delta}{s-b}$ (D) $\frac{\Delta}{s-c}$

(18) If $\sin x = \frac{\sqrt{3}}{2}$ and $x \in [0, 2\pi]$ then x is : (A) $\frac{5\pi}{3}, \frac{4\pi}{3}$ (B) $\frac{\pi}{4}, \frac{3\pi}{4}$ (C) $\frac{\pi}{3}, \frac{2\pi}{3}$ (D) $\frac{\pi}{6}, \frac{5\pi}{6}$

(19) $2\tan^{-1}A =$ (A) $\tan^{-1}\frac{2A}{1+A^2}$ (B) $\tan^{-1}\frac{2A}{1-A^2}$ (C) $\tan^{-1}\frac{1-A^2}{2A}$ (D) $\tan^{-1}\frac{1+A}{2A}$

(20) In any Triangle ABC, with usual notation $\tan\frac{\gamma}{2}$ = (A) $\sqrt{\frac{(s-a)(s-b)}{s(s-c)}}$ (B) $\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$ (C) $\sqrt{\frac{(s-c)(s-a)}{s(s-b)}}$ (D) $\sqrt{\frac{s(s-a)}{bc}}$

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Roll No.	817 - 27000	
Mathematics (Subjective)	Inter-A-2018	Inter (Part - I)
Time : 2 : 30 Hours	Session (2014 - 16) to (2017 - 19)	Total Marks : 80

Note : It is compulsory to attempt (8 – 8) parts each from Q.No.2 and 3 while attempt any 9 parts from Q. No.4 . Attempt any (03) questions from Part II. Write same Question No. and its Part No. as given in the question paper.

Part - I BWP-11-18 25 x 2 = 50

Q.No.2 (i) Simplify and justify each step $\frac{4 + 16x}{4}$ by using its properties.

(ii) Separate into Real and Imaginary Parts $\frac{i}{1 + i}$

(iii) Find the Inverse of a relation $\{ (x, y) \mid y = 2x + 3 , x \in \mathbb{R} \}$

(iv) If $A = \begin{bmatrix} 1 & -1 \\ a & b \end{bmatrix}$ and $A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find " a " and " b "

(v) Show that $\forall z \in C$, $z^2 + (\bar{z})^2$ is a Real Number.

(vi) If $A = \begin{bmatrix} i & 1 + i \\ 1 & -i \end{bmatrix}$, show that $A + (\bar{A})^T$ is Hermitian.

(vii) Find x , if $\begin{vmatrix} 1 & 2 & 1 \\ 2 & x & 2 \\ 3 & 6 & x \end{vmatrix} = 0$ (viii) Solve $x^3 + x^2 + x + 1 = 0$

(ix) Write two proper subsets of $\{ 0, 1 \}$ (x) Construct the truth Table of $P \longrightarrow (p \vee q)$

(xi) When $x^4 + 2x^3 + Kx^2 + 3$ is divided by $x - 2$, the remainder is 1, find the value of K.

(xii) If α, β are the roots of $x^2 - px - p - c = 0$, prove that $(1 + \alpha)(1 + \beta) = 1 - c$

Q.No.3 (i) Define Proper Rational Fraction. (ii) Define Harmonic Progression.

(iii) If $a_{n-2} = 3n - 11$, then find nth term of A.P.

(iv) How many terms of the given series $-7 + (-5) + (-3) +$ ---- amount to 65 ?

(v) Find Vulgar Fraction Equivalent to $1 \cdot \dot{3}\dot{4}$

(vi) Write values of : (i) $\sum_{K=1}^{n} K$ and (ii) $\sum_{K=1}^{n} K^3$

(vii) Find the value of " n " if ${}^{n}P_4 : {}^{n-1}P_3 = 9 : 1$

(viii) Find the number of Diagonals of 6 - Sided Figure.

(ix) By using Mathematical Induction show that

$1 + \frac{1}{2} + \frac{1}{4} + \text{--------} + \frac{1}{2^{n-1}} = 2\left(1 - \frac{1}{2^n}\right)$ is true for n = 1 and n = 2

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

(xi) Using Binomial Theorem, find the value of $\frac{1}{\sqrt[5]{252}}$ to three places of Decimals.

(xii) Let $S = \{ 1, 2, 3, \text{---} 9 \}$; Event $A = \{ 2, 4, 6, 8 \}$; Event $B = \{ 1, 3, 5 \}$; Find $P(A \cup B)$

Q.No.4 (i) Find the Radius of the Circle in which the arms of a Central Angle of Measure 1 radian cut off an Arc of length 35 cm.

(ii) Show that $\cos(\alpha + \beta)\cos(\alpha - \beta) = \cos^2\alpha - \sin^2\beta$

(iii) A ladder leaning against a vertical wall makes an angle of 24^0 with the wall. Its foot is 5 m from the wall. Find its length.

(iv) If α, β, δ are the angles of a Triangle ABC, then prove that $\cos\left(\frac{\alpha + \beta}{2}\right) = \sin\frac{\delta}{2}$

(v) Evaluate $\frac{\tan\frac{\pi}{3} - \tan\frac{\pi}{6}}{1 + \tan\frac{\pi}{3}\tan\frac{\pi}{6}}$ (vi) With Usual Notations show that $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$

(vii) Write any two laws of Tangents (viii) Define Period of a Trigonometric Function.

(ix) Prove that $\frac{2\tan\theta}{1 + \tan^2\theta} = 2\sin\theta\cos\theta$ (x) Prove that $\frac{\sin 8x + \sin 2x}{\cos 8x + \cos 2x} = \tan 5x$

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

(xii) Solve the Equation $\cos x = -\frac{1}{2}$

(xiii) Find the Solution of $\text{Cot}\,\theta = \frac{1}{\sqrt{3}}$ which lies in $[\,0, 2\pi\,]$

Part - II

Q.No.5 (a) Let A, B, C are any non-empty sets, then show that (5)

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$$

(b) Define Rank of a Matrix and find Rank of given Matrix : (5)

$$\begin{bmatrix} 1 & -1 & 2 & -3 \\ 2 & 0 & 7 & -7 \\ 3 & 1 & 12 & -11 \end{bmatrix}$$

Q.No.6 (a) Use Synthetic Division to find the values of p and q if $x + 1$ and $x - 2$ are the factors of the Polynomial $x^3 + px^2 + qx + 6$ (5)

(b) Resolve $\frac{2x^4}{(x-3)(x+2)^2}$ into Partial Fractions. (5)

Q.No.7 (a) Find " n " so that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ may be the Arithmatic Mean (A.M.) between " a " and " b " (5)

(b) Prove by Mathematical Induction that for all positive integral values of " n " (5)

$$\frac{1}{3} + \frac{1}{3^2} + \text{---------} + \frac{1}{3^n} = \frac{1}{2}\left[1 - \frac{1}{3^n}\right]$$

Q.No.8 (a) Prove that : (i) $(\text{Sec}\,\theta + \tan\theta)(\text{Sec}\,\theta - \tan\theta) = 1$

(ii) $(\text{Cos}^2\theta - \text{Sin}^2\theta) = \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$ (5)

(b) Show that (without using calculator) $\text{Cos}20^\circ\,\text{Cos}40^\circ\,\text{Cos}80^\circ = \frac{1}{8}$ (5)

Q.No.9 (a) Show that $r_3 = 4R\,\text{Cos}\frac{\alpha}{2}\text{Cos}\frac{\beta}{2}\text{Sin}\frac{\gamma}{2}$ with usual notations of $\triangle ABC$ (5)

(b) Prove that $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$ (5)

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