☆☆ Rwp-11-18 Inter. (Part-II)-A- 2018

Roll No._____ to be filled in by the candidate. (For all sessions)

Paper.Code | 6 | 1 | 9 | 3

Mathematics (Objective Type)

Time: 30 Minutes **Marks: 20**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given. Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1-1. In any $\triangle ABC$ $rr_1r_2r_3 =$ _____

(A) $\triangle^4$ (B) $\triangle^3$ (C) $\triangle^2$ (D) $\triangle$

2. With usual notation $\sqrt{\dfrac{(s-b)(s-c)}{bc}}$ is equal to:

(A) $\cos\dfrac{\alpha}{2}$ (B) $\sin\dfrac{\alpha}{2}$ (C) $\sin\dfrac{\beta}{2}$ (D) $\sin\dfrac{\gamma}{2}$

3. $\cos^{-1}(-x)$ is equal to:

(A) $\dfrac{\pi}{2} - \sin^{-1}x$ (B) $\dfrac{\pi}{2} + \sin^{-1}x$ (C) $\pi + \cos^{-1}x$ (D) $\pi - \cos^{-1}x$

4. Solution of the equation $\tan x + 1 = 0$ is:

(A) $\left\{\dfrac{3\pi}{4} + n\pi\right\}$ (B) $\left\{\dfrac{\pi}{4} + n\pi\right\}$ (C) $\{\pi + n\pi\}$ (D) $\{2\pi + n\pi\}$, when $n \in z$

5. If $z = a + ib$, what is the value of $\cos\theta$?

(A) $\dfrac{a}{|z|}$ (B) $\dfrac{b}{|z|}$ (C) $\dfrac{a}{b}$ (D) $\dfrac{b}{a}$

6. A function $f : A \to B$ is surjective if:

(A) Range $f = A$ (B) Range $f = B$ (C) Range $f \neq B$ (D) Range $f \neq A$

7. Determinant of any unit matrix has value:

(A) Greater than 1 (B) less than 1 (C) 1 (D) zero

8. A square matrix A is skew-symmetric if A^t is equal to:

(A) A (B) -A (C) A^t (D) A^2

9. The discriminant of $ax^2 + bx + c = 0$, $a \neq 0$ is:

(A) $b^2 + 4ac$ (B) $4ac - b^2$ (C) $b^2 - 4ac$ (D) $a^2 - 4ac$

The degree of the equation $x^3 + 3x^2 + 4x + 5 = 0$ is

(A) 4   (B) 3   (C) 2   (D) 1

11. $\dfrac{x^2 + 1}{Q(x)}$ will be improper fraction if

(A) Degree of $Q(x) = 2$ (B) Degree of $Q(x) = 3$

(C) Degree of $Q(x) = 4$ (D) Degree of $Q(x) = 5$

12. $\displaystyle\sum_{K=1}^{n} K$ is equal to:

(A) $\dfrac{n+1}{2}$ (B) $\dfrac{n}{2}$ (C) $\dfrac{n(n+1)}{2}$ (D) $\dfrac{n(n-1)}{2}$

13. The geometric mean between $-2i$ and $8i$ is:

(A) ± 1 (B) ± 2 (C) ± 3 (D) ± 4

14. If A and B are mutually exclusive events, then $P(A \cup B)$ is equal to:

(A) $P(A) + P(B)$ (B) $P(A) - P(B)$ (C) $P(AB)$ (D) $P(A) \cap P(B)$

15. If $\overset{n}{C}_{8} = \overset{n}{C}_{12}$, then n is equal to:

(A) 8   (B) 12   (C) 20   (D) 0

16. In the expansion of $(x+y)^8$, middle term is:

(A) T_4 (B) T_6 (C) T_3 (D) T_5

17. If n is a positive even integer, then $\binom{n}{1} + \binom{n}{3} + \binom{n}{5} + \cdots + \binom{n}{n-1}$ is equal to:

(A) 2^n (B) 2^{n+1} (C) 2^{n-1} (D) 3^n

18. An angle in the standard position whose terminal side falls on x-axis or y-axis is:

(A) General angle   (B) coterminal angle   (C) Quadrantal angle   (D) acute angle

19. $\cos(\pi + \theta)$ is equal to:

(A) $\sec \theta$ (B) $-\cos \theta$ (C) $\cos \theta$ (D) $-\sec \theta$

20. Range of Cosine function is:

(A) $(-1, 1)$ (B) $[-1, 1]$ (C) $[-1, 1)$ (D) $(-1, 1]$

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Mathematics (Essay Type)

Time: 2:30 Hours

Rwp-11-18

Marks: 80

Section -I

2. Write short answers of any eight parts from the following. 2x8=16

i. Separate into real and imaginary parts $\dfrac{i}{1+i}$.

ii. Simplify $\left(\dfrac{-1}{2}-\sqrt{3}\Big/2\,i\right)^3$.

iii. Write the converse and inverse of $q \to p$.

iv. Define the terms proper and improper subsets with example.

v. Find inverse of $\begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$.

vi. Differentiate between I_n to and on to function.

vii. For a square matrix A, $|A|=|A^t|$.

viii. What is Rank of matrix? Explain with example.

ix. Solve $15x^2 + 2ax - a^2 = 0$ by quadratic formula.

x. If α, β are roots of $3x^2 - 2x + 4 = 0$, find $\dfrac{\alpha}{\beta}+\dfrac{\beta}{\alpha}$.

xi. Does the set $\{0, -1\}$ possess closure property w.r.t "Addition" and "multiplication"?

xii. Show that roots of equation $(p+q)x^2 - px - q = 0$ are rational.

3. Write short answers of any eight parts from the following. 2x8=16

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

ii. If $y = 1 + \dfrac{x}{2} + \dfrac{x^2}{4} + \ldots\ldots\infty$, show that $x = \dfrac{2(y-1)}{y}$.

iii. Prove that $\sum\limits_{k=1}^{n} K = \dfrac{n(n+1)}{2}$.

iv. Find n, if $^nP_2 = 30$.

v. Find n, if $^nC_{10} = \dfrac{12\times 11}{2!}$.

vi. Define the probability.

vii. If 5 and 8 are arithematic means between a and b find a and b.

viii. Find 12th term of Harmonic progression $\dfrac{1}{3}, \dfrac{2}{9}, \dfrac{1}{6}, \text{———}$.

ix. In how many ways 4 keys be arranged on a circular key ring?

x. Prove the formula $1 + 3 + 5 + \ldots\ldots + (2n-1) = n^2$ for $n = 1, 2$.

xi. Find the term involving x^4 in the expansion of $(3-2x)^7$.

xii. Use binomial theorem, find the value to three decimal places $(1.03)^{\frac{1}{3}}$.

4. Write short answers of any nine parts from the following. 2x9=18

i. Verify $2\sin 45^0 + \dfrac{1}{2}\cos ec45^0 = 3\Big/\sqrt{2}$.

ii. Prove that: $\dfrac{2\tan\theta}{1+\tan^2\theta} = 2\sin\theta\cos\theta$.

iii. Prove that $\tan\left(45^0 + A\right)\tan\left(45^0 - A\right) = 1$.

iv. Prove that: $\dfrac{\sin 2\alpha}{1 + \cos 2\alpha} = \tan \alpha$.

v. Define period of a trigonometric function.

vi. Prove that $\gamma = (s - a)\tan\dfrac{\alpha}{2}$.

vii. Prove that $\tan^{-1}\dfrac{1}{4} + \tan^{-1}\dfrac{1}{5} = \tan^{-1}\dfrac{9}{19}$.

viii. Solve $\sin x + \cos x = 0$.

ix. Solve the trigonometric equation $\sec^2\theta = 4/3$.

x. Find the radius of the circle in which the arm of the central angle of measure 1 radian cut off an arc of length 35cm.

xi. If α, β be the angle of a triangle ABC then prove that $\cos\left(\dfrac{\alpha + \beta}{2}\right) = \sin \gamma/2$.

xii. Find the smallest angle of $\triangle ABC$,when $a = 37.34$, $b = 3.24$, $c = 35.06$.

xiii. Find area of triangle ABC given three sides $a = 18$, $b = 24$, $c = 30$.

Section -II

Note: Attempt any three questions from the following.

$10 \times 3 = 30$

5. (a) Convert into logical form and prove by truth table of $(A \cap B)' = A' \cup B'$.

(b) Find the value of λ if given system has non-trivial solution

$$x_1 + 4x_2 + \lambda x_3 = 0,\ 2x_1 + x_2 - 3x_3 = 0,\ 3x_1 + \lambda x_2 - 4x_3 = 0$$

6. (a) If α, β are the roots of $x^2 - px - p - c = 0$, then prove that: $(1 + \alpha)(1 + \beta) = 1 - C$.

(b) Resolve into partial fraction $\dfrac{x^2 + a^2}{\left(x^2 + b^2\right)\left(x^2 + c^2\right)\left(x^2 + d^2\right)}$

7. (a) The sum of 9 terms of a A.P is 171 and its eighth term is 31. Find the series.

(b) If x is very nearly equal 1 then prove that: $px^p - qx^q \simeq (p - q)x^{p+q}$.

8. (a) Find the value of remaining trigonometric function of $\sin \theta = -\dfrac{1}{\sqrt{2}}$

and the terminal arm of the angle is not in quad III.

(b) Prove that: $\dfrac{\sin 3\theta}{\cos\theta} + \dfrac{\cos 3\theta}{\sin\theta} = 2\cot 2\theta$.

9. (a) Prove that: $r_1 + r_2 + r_3 - r = 4R$.

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

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