DHAKA COACHING CENTRE

GRAND TEST 2020-2021

Class: XI Science **Max. Marks: 100**
Paper: Mathematics **Time: 2 Hours**

SECTION "A" (Multiple Choice Questions) (50 Marks)

NOTE: This question consists of 25 part questions and all are to be answered.
Each part question carries TWO marks.

Q.1. Select the correct answer from the given options.

i. 0! = _____.
a) 1 b) 0 c) -1 d) none of these

ii. If "n" is a negative integer then n! = _____.
a) zero b) ∞ c) does not exist d) none of these

iii. Sum of the first n natural numbers 1 + 2 + 3 + 4 + ……n = ∑n = _____.
a) $\frac{n(n+1)}{2}$ b) $\frac{n(n+1)(2n+1)}{6}$ c) $\frac{n^2(n+1)^2}{2}$ d) n^2

iv. Let P (x_1, y_1) and Q (x_2, y_2) be two points. If d be the distance between them then d = _____.
a) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ b) $\sqrt{(x_1 - x_2) + (y_2 - y_1)}$
c) $\sqrt{(x - x_2)^2 + (y - y_2)^2}$ d) $\sqrt{(x - x_1)^2 + (y - y_1)^2}$

v. tan $(\alpha + \beta)$= _____.
a) $\frac{tan\alpha - tan\beta}{1+tan\alpha\ tan\beta}$ b) $\frac{tan\alpha + tan\beta}{1-tan\alpha\ tan\beta}$ c) $\frac{Sin\alpha + Cos\beta}{1-Sin\alpha\ Cos\beta}$ d) $\frac{Sin\alpha - Cos\beta}{1+Sin\alpha\ Cos\beta}$

vi. The radius of in-circle is called in-radius and is denoted by r = _____.
a) $\frac{4\Delta}{abc}$ b) $\frac{a}{4\Delta}$ c) $\frac{\Delta}{8}$ d) $\frac{\Delta}{s-a}$

vii. For an e-circle r_2 = _____.
a) $\frac{\Delta}{s}$ b) $\frac{\Delta}{s-b}$ c) $\frac{\Delta}{s-a}$ d) $\frac{\Delta}{s-c}$

viii. In generally Sin^{-1} x _____ $(Sinx)^{-1}$.
a) < b) ≠ c) = d) >

ix. 2 + 4 + 6 + …… 2n + = _____.
a) n (n – 1) b) $\frac{n(n-1)}{2}$ c) n (n + 1) b) $\frac{n(n+1)}{2}$

x. An angle subtended at the centre of a circle by an arc equal to its radius is _____.
a) Degree b) Radian c) Angle d) none of these

xi. The degree measure of one radian is approximately equal to _____.
a) 57^0 b) 57.1^0 c) 57.2^0 d) 57.3^0

xii. The formula for the sum of the terms of Arithmetic sequence is _____.
a) $S_n = \frac{n}{2}\{2a + (n-1)d\}$ b) $S_n = \frac{n}{2}\{2a + (n+1)d\}$
c) $S_n = \frac{n}{2}\{2a - (n-1)d\}$ d) $S_n = \frac{n}{2}\{2a - (n+1)d\}$

xiii. If three terms are in A.P then they are denoted by _____.
a) a, a – d, a + d b) d – a, a, a – d c) a – d, a, a + d d) a + a, a, a + 2d

xiv. The solution set of the system $3x^2 - y^2 = 12$; $3x^2 + 4y^2 = 192$
a) (-4 . -6) b) 6, 4) c) (4, 6) d) (0, 0)

xv. The difference of two numbers is 5 and the difference of their square is 275. Find the smaller number.
a) 25 b) – 25 c) 20 d) – 15

xvi. If x and y be the sides of a rectangle then perimeter = _____.
a) $\left(\frac{x+y}{2}\right)$ b) $\left(\frac{x+y}{3}\right)$ c) 3x + 3y d) 2x + 3y

xvii. Let A = {2,3} , B = {3,4}, C = {4,5} then A x (B∩C) = _____.
a) ∅ b) { (2,4) , (3,4) }
b) c) { (3,4) , (4,5) } d) { (2,4) , (2,5) }

xviii. A∪ ∅ = ∅ ∪A = _____.
a) A b) $A^{/}$ c) ∅ d) ∪

xix. A number x is an _____ if x ∈ N, x = 0 or x ∈ - N.
a) Integers b) Whole c) Prime d) Even

xx. The rational numbers were introduced by _____
a) Arabs (1550 BC) b) Greek (1550 BC)
c) Egyptian (1550 BC) d) Indian (1550 BC)

xxi. In factorial form n (n – 1) (n – 2) ……. 3.2.1 = _____.
a) (n – 3)! b) n! c) $\frac{n!}{(n-3)!}$ d) none of these

xxii. The _____ is used to denote the number of elements in the set A.
a) A b) 0 (A) c) A (0) d) 0 x A

xxiii. $1 + \text{Cot}^2\,\theta$ = _____.
a) $\text{Cos}^2\,\theta$ b) $\text{Cosec}^2\,\theta$ c) $\text{Sec}^2\,\theta$ d) $-\text{Cosec}^2\,\theta$

xxiv. Sin $(\alpha - \beta)$ = _____.
a) $\text{Cos}\alpha\text{Cos}\beta + \text{Sin}\alpha Sin\beta$ b) $\text{Cos}\alpha\text{Cos}\beta - \text{Sin}\alpha Sin\beta$
c) $\text{Sin}\alpha\text{Cos}\beta + \text{Cos}\alpha Sin\beta$ d) $\text{Sin}\alpha\text{Cos}\beta - \text{Cos}\alpha Sin\beta$

xxv. A circle touches all the sides of a triangle is called _____.
a) e-Circle b) in-Circle c) Circum-Circle d) Ortho Circle

SECTION ' B ' SHORT -ANSWER QUESTIONS (30 Marks)

Note: Answer any six part questions from this section, selecting two part questions from each question.

Complex numbers and Algebra

Q2. i) Solve the following complex equations:
$(x + 2yi)^2 = xi$

ii) Show that $1 + i$ and $1 - i$ satisfy the equation
$z^2 - 2z + 2 = 0$

iii) Find m if the sum of the roots of $6z^2 - 3mz + 5 = 0$ is equal to the product its roots.

iv) If α, β are the roots of $8x^2 - 6x + 3 = 0$ form an equation whose roots are α^3, β^3

Q3. i) ${}^{2n+1}P_{n-1} : {}^{2n-1}P_n = 3.5$

ii) In a G.P , the first term is 7, the lat term is 448, and sum is 889. Find common ratio and number of terms.

iii) Find the sum of series .9 + .09 + .009 + .0009 + …….. to n terms

iv) Prove by mathematical induction:
4 + 5 + 12 + ……. + 4n = 2n(n+1)

Trigonometry

Q4. (i) If a point on the rim of a 21cm diameter fly wheel travels 5040m in a minute through. How many radians does the wheel turns in a second.

ii) Prove that $\tan^{-1}\theta = \text{Sin}^{-1}\frac{\theta}{\sqrt{1+\theta^2}}$

iii) For any triangle ABC, Derive law of tangent.

iv) Solve : $\tan 2\,\theta \cot\theta = 3$

Paper: Mathematics **Class: XI Science**

SECTION ' C ' (DETAILED-ANSWER QUESTIONS) (20 Marks)

Note : Attempt any two questions from this section

Q5. i) In a G.P (j+k)th term is x and (j-k)th term is y. Prove that jth term is $\sqrt{xy}$

ii) Find the term independent of x in $(x - \frac{2}{x})^{10}$

Q6. i) Two hikers start from the same point are walks 9km heading east the other one 10km heading 550 north east. How far apart are they as the end of their walks?

ii) Solve the system of equation:

$x + y = 5$

$\frac{3}{x} + \frac{2}{y} = 2$

Q7. i) Prove that

(a) $\cos 4x = 8\cos^4 x - 8\cos^2 r + 1$ b) $\frac{Sin\theta + Sin\emptyset}{Sin\theta - Sin\emptyset} = \frac{tan\theta + \emptyset/2}{tan\frac{\theta - \emptyset}{2}}$ c) $\frac{tan\theta + Sin\theta}{Cosec\theta - Cot\theta} = tan\theta \ Sin\theta$

ii) The measure of the two sides of a triangle are 4 and 5 units. Find the third side so that the area of triangle in 6 square unit.

OR

In a ΔABC prove that area of triangle $\Delta = \frac{1}{2}$ ab $\sin\theta$.