MATHEMATICS 2015

Time: 30 minutes **Max. Marks: 20**

SECTION 'A' MULTIPLE CHOICE QUESTION

1. Choose the correct answer for each from the given options: (20)

(i) The central angle of a minor arc is ------ than the inscribed angle of its corresponding major arc:
- Less • double • half • none of these

(ii) The short cut formula of arithmetic mean is:
- $\frac{\sum x}{n}$ • $A+\frac{\sum fD}{\sum f}$ • $\frac{n+1}{2}$ • $\frac{\sum fx}{n}$

(iii) The reciprocal of $\cot\theta$ is:
- $\frac{1}{\cos\theta}$ • $\tan\theta$ • $\frac{1}{\tan\theta}$ • none of these

(iv) The set of first three prime numbers is:
- {1,2,3} • {2,3,5} • {1,3,5} • {2,3,7}

(v) If $\sqrt{x} = 9$ then x = ------- • 3 • ±3 • 81 • 1/2

(vi) $\sqrt[y]{x}$, y is called the ------- of the root:
- radical • quantity • index • none of these

(vii) $1 + \cot^2\theta$ = ----- • $\mathrm{cosec}^2\theta$ • $\tan^2\theta$ • $\sec^2\theta$ • $\cos^2\theta$

(viii) If log7 x = 2 the value of x is:
- $x^2 = 7$ • $x^7 = x$ • $2^7 = x$ • $7^2 = x$

(ix) The third proportion to 6 and 18 is: • 12 • 54 • 36 • 324

(x) The square root of $(a - b)^2$ is:
- ±(a – b) • ±(a – b) (a – b) • ±(a + b) • none of these

(xi) A set which contains all the sets under consideration is called: • universal • null • sub • none of these

(xii) The set A = {2,3,5,7,11 ------} is closed with respect to:
- Addition • Multiplication • division • none of these

(xiii) A triangle having no sides congruent is called----triangle
- right • obtuse • isosceles • scalene

(xiv) If (x + 2 , 3y – 6) = (2x , y), then x = -------
- 4 • 2 • 6 none of the above

(xv) If a, b, c are in continued proportion, then:
- $ab = c^2$ • $a^2 = bc$ • $ac = b^2$ • none of these

(xvi) Line segment joining the vertex to the mid point of the opposite side of a triangle is called:
- altitude • centroid • median • none of these

(xvii) (9, – 3) is in ------- quadrant/axis:
- 1^{st} • 4^{th} • x • y

(xviii) The scientific notation of 756837 is:
- 7.56837×10^5 • 7.56837×10^{-5}
- 7.56837×10^{-4} • none of these

(xix) If $\bar{x} - 6$, n = 5, then $\sum x$ = -------- • 1.5 • 1.2 • 30 • 11

(xx) Cosec (90° – 30°) = sec --------
- 30° • 60° • 90° • none of these

MATHEMATICS 2015

Time: 2 ½ Hours **Max. Marks: 80**

SECTION "B" (SHORT-ANSWER QUESTIONS)

Note: Answer any 10 questions from this section. (50)

2. If A = {a, b, c} and B = {x , y} find only two binary relations in A x B.

3. Simplify: $\sqrt{\frac{(216)^{\frac{2}{3}}(25)^{\frac{1}{2}}}{\frac{1}{25}}}$

4. With the help of logarithmic table find the value of
$$\frac{\sqrt{431.5} \; x \; (1.2)^2}{\sqrt[3]{36.98}}$$

5. Find the value of $a^3 + b^3 + c^3 - 3abc$ when a + b + c = 15 and ab + bc + ca = 74

6. Resolve into factors:
$4a^2(3b - 4c) + 9b^2(4c - 2a) + 16c^2(2a - 3b)$

7. Find the solution set of: $-6 + |5x - 3| = 3$

8. If $A = \begin{bmatrix} 3 & 2 \\ 5 & 4 \end{bmatrix}$ Find A^{-1} and verify that $A.A^{-1} = 1$

9. If a side of a triangle is extended the exterior angle so formed is, in measure, greater than either of the two interior opposite angles. Prove it.

10. Eliminate "a" from the following equation:
$$a^2 + \frac{1}{a^2} = m^2, a^4 + \frac{1}{a^4} = b^4$$

11. Congruent chords of a circle (or congruent circles) are equidistant from its (or their) centre (s). Prove it.

12. If in θ = 3/5 , find the remaining trigonometric ratios, using trigonometric identities.

13. The line segment, joining the mid points of two sides of a triangle is parallel to the third side and half as long. Prove it.

14. What should be added to $x^4 + 4x^3 + 10x^2 + 5$ so that it may be a perfect square?

15. $If \frac{x}{a} = \frac{y}{b} = \frac{z}{c}$, Prove that $\frac{x^3}{a^2} + \frac{y^3}{b^2} + \frac{z^3}{c^2} = \frac{(x+y+z)^3}{(a,b,c)^2}$

16. Find the solution set of the following inequation:
$$\frac{x+5}{10} < \frac{25-4x}{5}, \forall x \varepsilon N$$

SECTION 'C' (DETAILED – ANSWER QUESTION)

NOTE: Attempt 3 questions from this section. Including Q.no.19 which is compulsory. (30)

(17) Factorize the following:
(i) $(x - 2y)^3 - 64z^3$ (ii) $4a^4 + 625b^4$
(iii) $x^2 + 15x + 36$ (iv) $4x^4 - a/16$

18. Find the solution set of the following equations graphically. (Find four ordered pairs for each equation).
3x – 1 = y ; x – 3y = 9

19. In a correspondence of two triangles, if three sides of one triangle are congruent to the corresponding three sides of the other, the two triangles are congruent. Prove it.

20.(a) A set of data contains the values as 148, 145, 160, 157, 156, 160, 160, 165, show that the mode > median > Mean.

(b) Find the factors of $x^3 - 21x + 20$ by means of the remainder theorem.

21. Construct a triangle PQR in which $m\overline{PQ} = 6cm$, $m\overline{Qr} = 5cm$, and $m\angle Q = 70^\circ$. Draw the in-circle of the triangle and write the steps of construction.