Model question – 2077

Grade: 11

Full marks: 75 **Time : 3 hours**

Attempt all the questions

Group A **(1 × 11 = 11)**

Rewrite the correct option in your answer sheet

1. Which of the following is a statement?

   (a) The fishes are beautiful (b) Study mathematics.

   (c) x is a capital of country y. (d) Water is essential for health.

2. The value of : $\sqrt{-16} \times \sqrt{-25}$ is

   (a) -20 (b) -20i (c) 20i (d) 20

3. If $\angle C = 60^0$, b = 5 cm and a = 4 cm of ΔABC, what is the value of c?

   (a) 3.58 cm (b) 4.58 cm (c) 4.89 cm (d) 4.56

4. In a triangle ABC, B =120°, a = 1, c = 1 then the other angles and sides are

   (a) 35, 45, $\sqrt{2}$ (b) 10, 50, $\sqrt{3}$ (c) 20, 40,2 (d) 30, 30, $\sqrt{3}$

5. The cosine of the angle between the vectors $\vec{a} = \vec{\imath} - 2\vec{\jmath} + 3\vec{k}$ and $\vec{b} = \vec{\imath} + 3\vec{\jmath} + 3\vec{k}$ is

   (a) $\frac{1}{14}$ (b) 14 (c) $\sqrt{14}$ (d) 196

6. The equation of parabola with the vertex at the origin and the directrix y - 2 = 0 is..

   (a) $x^2 - 8y = 0$ (b) $y^2 + 8y = 0$ (c) $x^2 + 8y = 0$ (d) $y^2 - 8y = 0$

7. A mathematical problem is given to three students Sumit, Sujan and Rakesh whose chance of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{a}$ respectively. The probability that the problem is solved is $\frac{3}{4}$? The possible values of a are

   (a) $\frac{9}{2}$ (b) 4 (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

8. $\lim_{\theta \to 0} \frac{Sin\theta}{\theta}$ is equal to

   (a) 0 (b) ∞ (c) 1 (d) $\frac{0}{0}$

9. The derivatives of $\frac{4x^2 + 3}{3x^2 - 2}$ is….

(a) $\frac{-34x}{(3x^2-2)^2}$ (b) $\frac{30x^2}{3x^2-2}$ (c) $\frac{-32x}{(3x^2-2)^3}$ (d) $\frac{-31x}{(3x-2)^2}$

10. By Newton's Raphson, the positive root of $x^3 - 18 = 0$ in (2, 3) is

(a) 2. 666 (b) 2.621 (c) 2.620 (d) 2.622

11. Two forces acting at an angle of 45° have a resultant equal to $\sqrt{10}N$, if one of the forces be $\sqrt{2}N$, what is the other force.

(a) 1N (b) 2N (c) 3N (d) 4N

OR

The total cost function of a producer is given as C = 500 + 30Q + $\frac{1}{2}Q^2$ .What is the marginal cost (MC) at Q = 4 is

(a) Rs.38 (b) Rs.34 (c) Rs.30 (d) Rs.28

Group B **(5 × 8 = 40)**

12. A function $f(x) = x^2$ is given. Answer the following question for the function f(x).

(i) What is the algebraic nature of the function?

(ii) Write the name of the locus of the curve.

(iii) Write the vertex of the function.

(iv) Write any one property for sketching the curve.

(v) Write the domain of the function.

13. Compare the sum of n terms of the series: $1 + 2a + 3a^2 + 4a^3 + \ldots\ldots\ldots$and $a + 2a + 3a + 4a \ldots$up to n terms.

14. a) In any triangle, prove that: $(b + c) \sin {}^{A}/_{2} = a \sin(\frac{A}{2} + B)$ (3)

b) Express $\vec{r}$ = (4, 7) as the linear combination of $\vec{a}$= (5, - 4) and $\vec{b}$= (-2, 5) (2)

15. Calculate the appropriate measure of Skewness for the data below.

Class	0-10	10-20	20-30	30-40	40-50	50-60
No of workers	10	12	25	35	40	50

16. Define different types of discontinuity of a function. Also write the condition for increasing, decreasing and concavity of function. (2+3)

17. Evaluate: $\int \frac{x^2 dx}{\sqrt{a^2 - x^2}}$

18. Define Trapezoidal rule. Evaluate using Trapezoidal rule for $\int_0^1 \frac{dx}{1+x}$ n = 4.

19. State sine law and use it to prove Lami's theorem.

OR

A decline in the price of good X by Rs. 5 causes an increase in its demand by 20 units to 50 units. The new price is X is 15.

(i) Calculate elasticity of demand.

(ii) The elasticity of demand is negative, what does it mean?

Group – C **(8 × 3 = 24)**

20. (a) The factor of expression ω^3-1 are ω-1 and $\omega^2 + \omega + 1$. If ω^3-1 = 0

(i) Find the possible values of ω and write the real and imaginary roots of ω. (2)

(ii) Prove that: $\begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix} = 0$. Where n is positive integer. (4)

(b) Verify that: $|x + y| \leq |x| + |y|$ with x = 2 and y = -3 (2)

21. (a) The single equation of pair of lines is $2x^2 + 3xy + y^2 + 5x + 2y - 3 = 0$

(i) Find the equation of pair straight lines represented by the single equation. (4)

(ii) Are the pair of lines represented by the given equation passes through origin? Write with reason. (1)

(iii) Find the point of intersection of the pair of lines. (2)

(b) If three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are mutually perpendicular unit vectors in space then write a relation between them. (1)

22. (i) Distinguish between derivative and anti-derivative of a function. Write their physical meanings and illustrate with example in your context. Find, the differential coefficient of logSinx with respect to x. (1+ 2+2)

(ii) Find the area bounded by the y – axis, the curve $x^2 = 4(y - 2)$ and the line y = 11. (3)

AMBITION ACADEMY S.SCHOOL

Practice model set II 2078

Class : - XI **Sub: Mathematics**

Set B

Group 'A' [11 × 1 = 11]

1. For any two real numbers x and y
   a. $|x+y| \leq |x| + |y|$ b. $|x+y| \geq |x| + |y|$
   c. $|x+y| < |x| - |x|$ d. $|x+y| > |x| + |y|$
2. The absolute value of $\frac{1-2i}{2+i}$ is
   a. 1 b. 2 c. -2 d. -1
3. $For\ any\ triangle\ ABC, If\ A = 45^0, B = 60^0\ then\ a:c =$
   a. $1:(\sqrt{3}+1)$ b. $2:(\sqrt{3}+1)$
   c. $3:(\sqrt{3}+1)$ d. $5:(\sqrt{3}+1)$
4. In any triangle ABC, $\frac{b-cco}{a-ccosB} =$
   a. $\frac{\sin A}{sinB}$ b. $\frac{\sin}{\sin A}$ c. $\frac{tan\ A}{Tan\ B}$ d. none
5. If the vectors (3, -4, 7) and (2, 5, m) are perpendicular then the value of m is
   a. 0 b. 1 c. 2 d. 3
6. The vertex of parabola $(y-2)^2 = 4x - 12$ is
   a. (2,3) b. (3,2) c. (-2,-3) d. (-3,-2)
7. The probability that a leap year contains leap year selected at random contains 53 Sundays is
   a. 1/7 b. 2/7 c. 3/7 d. 4/7
8. The value of $\lim_{x\to 0} \frac{a^x-1}{x}$ is
   a. 0 b. 1 c. a d. $log\boldsymbol{a}$
9. The derivative of e^{3x} is
   a. e^{3x} b. $e^{3x} - 1$ c. $3e^{3x}$ d. $\frac{1}{3}e^{3x}$
10. The minimum number of iterations to get the root by bisection method with a = 1, b = 2 and toulerance 10^{-4} is
    a. 12 b. 13 c. 14 d. 15
11. If P = 24 N and Q = 7 N denote two component forces acting at an angle ɵ = 90^0 then the resultant R is
    a. 15 N b. 20 N c. 25 N d. 30 N

Group 'B' [8 × 5 = 40]

12. a. If $f(x) = 3x^2 - 4\ \&\ g(x) = 2x - 5$. Find $f \circ g(x)$ and $g \circ f(x)$. [3]
    b. Define odd function with example. [2]
13. a. Prove that A.M., G.M. and H.M. between any two unequal positive numbers satisfy the following relations;
    i) $(G.M)^2$ = A.M. × G.M.
    ii) A.M. > G.M.> H.M.
14. a. In any triangle ABC prove that :
    $a^2 + b^2 + c^2 - 2(bc \cos A + ca \cos B + ab \cos C) = 0$ [2]
    b. Prove by vector method : Cos (A+B) = cosA cosB – sinA sinB. [3]
15. Calculate appropriate coefficient of Skewness from the following data:

Profits in '000'	Below 20	Below 40	Below 60	Below 80	Below 100
No of companies	8	20	50	64	70

16. Prove that $\lim_{\theta\to 0} \frac{Sin\theta}{\theta} = 1$, where θ measured in radian.
17. a. Evaluate : $\int \frac{1}{\sqrt{2x+1} - \sqrt{2x-3}}\, dx$ [2]
    b. Find the area of circle $x^2 + y^2 = 16$ by the method of calculus. [3]
18. Starting with interval [1, 2], find the square root of 2 within an error of 0.01
19. If a diameter of a vertical circle is inclined at an angle ɵ = $\cos^{-1}(1/4)$ with its vertical diameter, show that the time of sliding the diameter is twice that of falling down the vertical diameter.

Group "C" [3×8 = 24]

20. a. Find the square root of the complex number -5 + 12i [4]
    b. If z and w be two complex numbers prove that : |z| + |w| ≥ |z + w| [4]
21. a. Prove that the circle $x^2 + y^2 + 2ax + c^2 = 0$ and $x^2 + y^2 + 2by + c^2 = 0$ touch if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$. [5]
    b. Find the equation of parabola in standard form. [3]
22. a. From first principle, find the derivative of $(2x + 3)^{1/2}$ [4]
    b. Find the local maxima and local minima of the function f(x) = $4x^3 - 15x^2 + 12x + 7$. Also, find the point of inflection. [4]
