Class 11th   Mathematics

Time Allowed: 3 Hours   Maximum Marks: 80

General Instructions:

1.   This Question paper contains - Four sections A, B, C and D. Each section is compulsory.

2.   Section A-Question 1 to 10 comprises of 10 questions of 1 mark each

3.   Section B-Question 11 to 20 comprises of 10 Very Short Answer (VSA)-type questions of 2 marks each.

4.   Section C-Question 21 to 28 comprises of 8 Short Answer (SA)-type questions of 4 marks each.

5.   Section D-Question 29 to 31 comprises of 3 Long Answer (LA)-type questions of 6 marks each.

SECTION A

Q.1) If A and B are any two sets, then A-B=
(a) $A \cup B$ (b) $A \cap B'$ (c) $A \cap B$ (d) None of these

Q.2.) If $f(x) = x^3 - \dfrac{1}{x^3}$ then $f(x) + f\left(\dfrac{1}{x}\right)$

(a) $2x^3$ (b) $\dfrac{2}{x^3}$ (c) 0   (d) 1

Q.3.) If $\sin \theta = \dfrac{4}{5}$ and θ lies in third quadrant then the value of $\cos \theta$ is

(a) $\dfrac{3}{5}$ (b) 0   (c) $\dfrac{\sqrt{3}}{5}$ (d) $-\dfrac{3}{5}$

(a)

Q.4.) If a,b, ,c are real numbers such that a>b,c<0 then
(a) ac<bc   (b) ac>bc   (c) $ac \leq bc$ (d) $ac > bc$

Q.5.) If $\dfrac{1}{\lfloor 8} - \dfrac{1}{\lfloor 9} = \dfrac{x}{\lfloor 10}$ then x is equal to

(a) 100   (b) 90   (c) 170   (d) None of these

Q.6.) Eccentricity of an ellipse is
(a) <1   (b) =1   (c) >1   (d) 0

Q.7.) Equation of a circle with centre(0,0) and radius=1 is
(a) $x^2 - y^2 = 1$ (b) $x^2 + y^2 = 1$ (c) $x + y = 1$ (d) $x - y = 1$

Q.8.) If 24x<100 then x is
(a) A natural number (b) an integer (c) a real number   (d) infinite

Q.9.) Mean of first n-odd natural numbers is
(a) -n   (b) 0   (c) n   (d) n^2

Q.10.) If probability P(A) =0.53 then P(not A) is

(a) 0   (b) 1   (c) 0.47   (d) -1

SECTION B

Q.11.) Write down all the subsets of $A=\{a,b\}$.

Q.12.)   If $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{2, 4, 6, 8\}$, then find $A - B$ and $B-A$

Q.13). Reduce the equation $3x+5y-7=0$ to the intercept form.

Q.14.) Find the equation of a circle with centre $(0,2)$ and radius $= 2$.

Q.15.) Find the equation of parabola with focus $(2,0)$ and which passes through $(3,4)$

Q.16. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second.

Q.17. A coin is tossed three times.consider the following events:A 'no head appears'. B " exactly one head appears' C 'atleast two heads appear', Do they form a set of mutually exclusive and exhaustive events.

Q.18. Find the mean deviation about the mean for the data 4,7,8,9,10,12,13,17.

Q.19. How many chords can be drawn through 21 points on a circle.

Q.20. Find the relation between A.M. and G.M.

SECTION C

Q.21. Define a relation R on a set N of natural numbers by $R=\{(x,y); y=x+5, x<4, x, y$ are natural numbers$\}$. Write R in roster form and its domain and range.

Q.22. Prove that

$$\frac{\sin x - \sin y}{\cos x + \cos y} = \tan(\frac{x-y}{2})$$

Q.23. Express the following in a+ib form

$$\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+i\sqrt{2})-(\sqrt{3}-i\sqrt{2})}$$

Q.24. Find all pairs of consecutive even positive integers both of which are smaller than 10 such that their sum is more than 11.

Q.25. Find the angle between the lines

$$\sqrt{3}x + y = 1 \qquad \text{and} \qquad x + \sqrt{3}y = 1$$

Q.26. Find the derivative of f from the first principle when $f=x+1/x$.

Q.27. Find the derivative of

$$y = \frac{x}{1 + \tan x}$$

Q.28. Find r, if $5\,{}^4P_r = 6\,{}^5P_{r-1}$.

SECTION D

Q.29.prove that

$$(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\left(\frac{x+y}{2}\right)$$

Or

Prove that

$$\cos\left(\frac{3\pi}{2} - x\right)\cos(2\pi + x)\left[\cot\left(\frac{3\pi}{2} - x\right) + \cos(2\pi - x)\right] = 1$$

Q.30. In how many ways can be letter of the word PERMUTATIONS be arranged if there are always 4 letters between P and S.

Or

Determine the value of n, if (i) C(2n,3):C(n,2)=12:1   (ii) C(2n,3):C(n,3)=11:1

Q.31. The diameter of circles (in mm) drawn in a design are given below:

Diameter:	33-36	37-40	41-44	45-48	49-52
No. Of Circles:	15	17	21	22	25

Calculate the Standard Deviation and mean diameter of circles.

Or

The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English examination is 0.75, what is the probability of passing the Hindi examination.