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Register Number:	edi	OCT	10° C	Britt	[3]

Subject Code: 35

MATHEMATICS

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[Total No. of questions: 52]

[Max. Marks: 80

Instructions:

1) The question paper has **five** Parts namely **A**, **B**, **C**, **D** and **E**. Answer **all** the Parts.

2) Part – A has 15 multiple choice questions, 5 fill in the blank questions.

PART - A

Answer all the multiple choice questions :



 $(15 \times 1 = 15)$

1) The interval form of the $\{x : x \in R, -4 < x \le 6\}$ set is

- A) [-4, 6]
- B) (-4, 6]
- C) (-4, 6)
- D) [-4, 6)

2) If the set 'A' has 3 elements and the set 'B' has 3 elements then the number of elements in $A \times B$ are

- A) 9
- B) 6
- C) 3
- D) 27



3) The radian measure of 240° is

- A) $\frac{\pi}{3}$
- B) $\frac{3\pi}{4}$
- C) $\frac{\pi}{4}$
- D) $\frac{4\pi}{3}$

4) The simplest form of the complex number i⁻³⁵ is

- Δ۱ i
- B) -i
- C) 1

D) -1

5) The solution set of the inequality 30x < 200. Where $x \in N$ is



A) {1, 2, 3, 4, 5, 6}

- B) {0, 1, 2, 3, 4, 5, 6}
- C) {1, 2, 3, 4, 5, 6, 7}
- D) {..., -2, -1, 0, 1, 2, ...}

6) If ${}^{n}C_{9} = {}^{n}C_{8}$, then ${}^{n}C_{17}$ is

- A) 17
- B) 7
- C) 1

D) 10

7) In the expansion of $(a + b)^n$, the sum of the indices of 'a' and 'b' is

- A) n+1
- B) 2n
- C) n-1
- D) n

P.T.O.



8)	The 4 th	term	of	the	sequence	defined	by
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$$a_n = \frac{n}{n+1}$$
 is

A)	$\frac{5}{4}$
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B)
$$\frac{4}{5}$$

C)
$$\frac{4}{3}$$

D)
$$\frac{3}{4}$$

9) Equation of a line parallel to x-axis and passing through the point (-2, 3) is

A)
$$x = 3$$

B)
$$x = -2$$

C)
$$y = 3$$

D)
$$y = -2$$

10) Equation of a circle with centre (0, 0) and radius 'r' units is



A)
$$(x-a)^2 + (y-b)^2 = r^2$$

B)
$$x^2 + y^2 = 1$$

C)
$$x^2 + y^2 = r^2$$

D)
$$(x + a)^2 + (y + b)^2 = r^2$$

11) The length of the Latus rectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

A)
$$\frac{2b}{a^2}$$

B)
$$\frac{2a}{b^2}$$

C)
$$\frac{a}{2b^2}$$

D)
$$\frac{2b^2}{a}$$

12) The octant in which the point (-4, 2, -5) lie



13) The value of $\lim_{x\to 0} \frac{\cos x}{\pi - x}$ is

B)
$$\frac{1}{\pi}$$

D) limit does not exists

14) The mean value for the following data is:

- A) 10
- B) 9
- C) 8

D) 12

15) The probability of drawing a club card from a well shuffled deck of 52 cards is

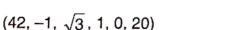
A)
$$\frac{1}{13}$$

B) $\frac{1}{52}$

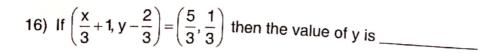
C) $\frac{1}{4}$

D) $\frac{1}{2}$

II. Fill in the blanks by choosing appropriate answer from those given in the brackets:



 $(5 \times 1 = 5)$





- 17) The value of $sin(n\pi)$ is _____, where $n \in z$.
- 18) The value of $\frac{7!}{5!}$ is _____



- 19) The slope of the line making inclination of 60° with the positive direction of x-axis is
- 20) The derivative of $x^2 2$ at x = 10 is _____

PART – B

III. Answer any six questions :

 $(6 \times 2 = 12)$

21) Let $V = \{a, e, i, o, u\}$ and $B = \{a, i, k, u\}$. Find V - B and B - V.



- 22) Let $A = \{a, b\}, B = \{a, b, c\}.$ Is $A \subset B$? What is $A \cup B$?
- 23) Prove that $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} \tan^2 \frac{\pi}{4} = -\frac{1}{2}$.
- 24) Find the multiplicative inverse of the Complex Number $Z = \sqrt{5} + 3i$.
- 25) Express 3(7 + i7) + i(7 + i7) in the form a + ib.



- 26) Solve $5x 3 \ge 3x 5$ and show the graph of the solution on number line.
- 27) How many 3-digit even numbers can be formed from the digits 1, 2, 3, 4, 6, 7 if no digit is repeated?
- 28) Using Binomial Theorem, evaluate (99)3.
- 29) Find the equation of the line intersecting the x-axis at a distance of 3 units to the left of origin with slope -2.



- 30) Evaluate $\lim_{x\to 0} \frac{\sqrt{1+x}-1}{x}$.
- 31) A die is thrown. Describe the following events:
 - i) A: a number less than 4.



ii) B : a number not less than 3.

PART - C

IV. Answer any six questions:

 $(6 \times 3 = 1)$

32) If U = {1, 2, 3, 4, 5, 6, 7, 8, 9}
$$A = \{2, 4, 6, 8\} \text{ and } B = \{2, 3, 5, 7\}.$$



Verify that $(A \cup B)' = A' \cap B'$.

- 33) Let $f(x) = x^2$ and g(x) = 2x + 1 be two real valued functions. Find (f + g)(x), (f - g)(x) and (fg)(x).
- 34) Prove that $\sin 3x = 3 \sin x 4 \sin^3 x$.

35) If
$$x + iy = \frac{a + ib}{a - ib}$$
, prove that $x^2 + y^2 = 1$.

36) If $tanx = \frac{-5}{12}$, x lies in II quadrant, find the values of other five trigonometric functions.



- 37) Find all pairs of consecutive odd natural numbers, both of which are larger than 10, such that their sum is less than 40.
- 38) If A.M. and G.M. of two positive numbers 'a' and 'b' are 10 and 8 respectively. Find the numbers.
- 39) Derive the equation of the line with x-intercept 'a' and y-intercept 'b' in the form

$$\frac{x}{a} + \frac{y}{b} = 1$$
.



- 40) Find the equation of the parabola whose vertex is (0, 0), passing through the point
- 41) Show that the points P(-2, 3, 5), Q(1,2, 3) and R(7, 0, -1) are collinear.



42) Find the derivative of $y = \sin x$ with respect to x from first principle method.

V. Answer any four questions:

 $(4 \times 5 = 20)$

- 43) Define Modulus function. Draw the graph of it. Also write its domain and range.
- 44) Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x.$



- 45) A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has:
 - i) no girl ?
 - ii) at least 3 girls?
- 46) State and prove 'Binomial Theorem' for positive integral index 'n'.
- 47) Prove that the length of the perpendicular from a point (x1, y1) to a line

$$Ax + By + C = 0 \text{ is } d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}.$$



48) Prove geometrically that,

$$\lim_{x\to 0}\frac{\sin x}{x}=1, \text{ where 'x' being measured in radians.}$$

49) Find the mean deviation about mean for the following data:

x _i	5	10	15	20	25
fi	7	4	6	3	5



- 50) A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be:
 - i) red



- ii) yellow
- iii) blue
- iv) not blue.

PART - E

VI. Answer the following questions:



51) Prove geometrically that

$$cos(x + y) = cosx.cosy - sinx.siny.$$

OR

Derive the equation of ellipse in the standard form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

52) Find the sum to 'n' terms of the sequence 8, 88, 888, ...

OR



Find the derivative of $\frac{\cos x}{1+\sin x}$ w.r.t. x.