

**D. Voc Mechanical Manufacturing**  
**Subject: Applied Mathematics-1**  
**Subject Code: MTH-301**  
**Semester: First**  
**September 2022**  
**Theory (External): 70 Marks**  
**Time: 03 Hours**

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**Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 2 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 10 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

**Roll Number**

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**SECTION –A (SHORT/OBJECTIVE TYPE QUESTIONS)****(10x2=20 Marks)**

- A Let  $A = \{a, b, c\}$  and  $B = \{1, 2\}$  then the number of relations from A into B are
- 6
  - 5
  - 32
  - 64
- B Let  $A = \{x: x \text{ is a letter in the word FOLLOW}\}$ ,  $B = \{y: y \text{ is a letter in the word WOLF}\}$
- A & B are disjoint
  - $A=B$
  - A B
  - None of these
- C If the Harmonic mean of 60 and X is 48, then find the value of X
- 32
  - 36
  - 40
  - 44
- D The roots of  $100x^2 - 20x + 1 = 0$  is:
- $1/20$  and  $1/20$
  - $1/10$  and  $1/20$
  - $1/10$  and  $1/10$
  - None of the above

- E The value of  $\cos 5\pi$  is
- 0
  - 1
  - 1
  - None of these
- F  ${}^6C_2$  is equal to
- 15
  - 10
  - 14
  - 12
- G The greatest coefficient in the expansion of  $(1+x)^{10}$  is
- $10! / (5!)$
  - $10! / (5!)^2$
  - $10! / (5! \times 4!)^2$
  - $(10! / (5! \times 4!))$
- H The number of elements in the power set  $P(S)$  of the set  $S = \{(\phi), 1(2,3)\}$  is \_\_\_\_\_.
- 4
  - 8
  - 2
  - None of these
- I The number of ways 4 boys and 3 girls can be seated in a row so that they are alternate is
- 12
  - 104
  - 144
  - 256

J Slope of line passing through the points (3,-2) and (-1,4)

- a.  $-3/2$
- b. 2
- c.  $-2$
- d.  $-1$

**SECTION -B (ESSAY TYPE QUESTIONS)**  
(5x10=50 Marks)

1 If  $f: R \rightarrow R$  then draw the graph of the function

- (i)  $f(x) = x^3 + 1$
- (ii)  $f(x) = 1 - 3x$

2 (i) Find the harmonic mean of 5, 10 and 15.

(ii) The sum of four numbers in a Geometric Progression is 60 and their product is 16384. Find the numbers.

3 (i) In a survey of 600 students in a school, 150 students were found to be drinking Tea and 225 drinking Coffee, 100 were drinking both Tea and Coffee. Find how many students were drinking neither Tea nor Coffee.

(ii) Find the Coefficient of  $x^4$  in the expansion of  $(1-2x)^6$

4 Prove that :  $\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$

- 5 i. Write the equation of line passing through the points (-3,4) and (4,5).
- ii. Find the distance of the point P(5,6) from the line AB,  $-2x+3y+4=0$ , using the distance of the point from a line formula.

6 Decompose the following in to the partial fraction:

$$125+4x-9x^2 / (x-1)(x+3)(x+4)$$

- 7 i) If  $\tan x = -5/12$  and  $x$  lies in II quadrant. Find the values of other five trigonometric functions.
- ii) In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student likes to play at least one of the two games. How many students like to play both cricket and football?

8 i) The sums of  $n$  terms of two arithmetic progressions are in the ratio  $5n + 4 : 9n + 6$ . Find the ratio of their 18th terms.

ii) Line through the points  $(-2, 6)$  and  $(4, 8)$  is perpendicular to the line through the points  $(8, 12)$  and  $(x, 24)$ . Find the value of  $x$ .

**END OF PAPER**