

# D125/P131/P30/P32/CMP501/CMP250/EE/20220626

Time : 3 Hours 45 Minutes

Marks : 80

## Instructions :

1. All Questions are Compulsory.
2. Each Sub-question carry 5 marks.
3. Each Sub-question should be answered between 75 to 100 words. Write every questions answer on separate page.
4. Question paper of 80 Marks, it will be converted in to your programme structure marks.

1. Solve any **four** sub-questions.
    - a) Draw example of each of the following (Give Justification) 5
      - i) 1. Connected Graph
      2. Null Graph
      3. Complete Graph
    - ii) If  $f: \mathbb{R} \rightarrow \mathbb{R}$  is a function defined as  $f(x) = 3x + 2$  where  $\mathbb{R}$  is a set of real numbers. Then is  $f$  a Objective functions prove.
  - b) Solve the following: 5
    - i) Convert  $(10001110)_2$  to decimal equivalent number,
    - ii) Find the roots of  $3x^3 - x - 10 = 0$
  - c) Simplify: 5
    - i)  $\sqrt[3]{2^6}$
    - ii)  $\sqrt[3]{5^4}$
  - d)
    - i) Prove the tautology for the equation  $(\sim pv \sim q) \vee p$
    - ii) Write the Converse, Inverse, Contra positive for the given statement. If two triangles are congruent then their sides are equal. 5
  - e) Consider a Vowels a, e, o, u and right consonants b, c, d, p, q, r, s, t from English alphabet find the number of the lettered word (meaningful or meaningless) containing 2 different vowels and 3 different consonants from above 12 letters. 5
2. Solve any **four** sub-questions.
  - a) Find all roots of  $x^3 + x^2 - x - 1 = 0$ . 5
  - b) Find out the surface area  $S$  of right circular cone that has height 20 cm and the radius of the circular base 15 cm. 5

- c) Find the difference between two polynomials 5

$$p(x) = 6x^3 + 9x^2 + \frac{1}{2}$$

$$q(x) = 4x^3 + \frac{1}{4}x - 4$$

- d) Explain how will you represent vector in plane. 5
- e) A man has three hats, 6 shirts and 2 pants with him. How many different outfits he can assemble? 5

3. Solve any **four** sub-questions.

- a) Write all the types of closure of relation with one example of each. 5
- b) Convert the following Hexadecimal 3 no's into decimal equivalent number. 5
- i)  $(5942)_{16}$
- ii)  $(ABCD)_{16}$
- c) How many ways are there to form a committee of 5 from four men and six women? 5
- d) Explain planar graphs with diagrams. 5
- e) Let  $f(x) = 3x - 2$   
 $g(x) = 6x^2 + 9x + 3$   
Are two polynomials then divide  $g(x)$  by  $f(x)$  5

4. Solve any **four** sub-questions.

- a) What is the simplest form of the surd? 5
- i)  $3\sqrt{1250}$
- ii)  $4\sqrt{1875}$
- b) Prove that  $7^n - 1$  is divisible by 6 for all natural numbers  $n > 1$  by induction. 5
- c) Find the roots of  $x^2 - 6x + 9 = 0$  5
- d) Give any 5 types of matrices with one example of each. 5
- e) Define scalar multiplication of vectors what are properties of scalar multiplication. 5

