

Subject to the constraints:

$$x + 2y \leq 10,$$

$$3x + y \leq 15,$$

$$x \geq 0, y \geq 0$$

### Section-C

**Note:** Long answer type questions. Attempt any one questions. out of two questions. (10x1=10)

Q.19 Solve the following system of equation by matrix method.

$$x + y + z = -1$$

$$x + 2y + 3z = -4$$

$$x + 3y + 4z = -6$$

Q.20 Find all the point of maxima & minima and the corresponding. maximum and minimum values of the function:

$$f(x) = x^3 - 12x^2 + 5$$

No. of Printed Pages : 4

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**Level 3, 2nd Sem/ DVOC ( Ref. & Air Cond., Auto. Servicing, ITM, PT, SD, AMT, FP, EMS, GM)**

**Subject : Applied Mathematics-II**

Time : 2 Hrs.

M.M. : 50

### Section-A

**Note:** Very Short answer type questions. Attempt all ten questions. (10x1=10)

Q.1 If  $(a,b) \in R$  and  $(b,c) \in R$  implies that  $(a,c) \in R$  for all  $a,b,c, \in X$ , then  $R$  is a \_\_\_\_\_ relation in  $X$ .

- (a) Symmetric (b) Reflexive  
(c) Transitive (d) None of these

Q.2 What is the degree of the differential equation  $\left(\frac{dy}{dx}\right)^3 + \tan y = 0$ ?

Q.3 The matrix  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$  is an example of

- (a) Column matrix (b) Row matrix  
(c) Identity matrix (d) None of these

Q.4 Fill in the blank:

The function  $F(x) = \sin x$  is a \_\_\_\_\_ function at every real number (continuous/discontinuous)

Q.5 Fill in the blank:  $\frac{d}{dx} (\log x) =$  \_\_\_\_\_.

Q.6 Fill in the blank:  $\int \frac{2}{x^2} dx =$  \_\_\_\_\_.

Q.7 If  $\vec{A} = 2\hat{i} - 4\hat{j} + 4\hat{k}$  then magnitude of vector  $\vec{A}$  is

(a) 4 (b) 5

(c) 6 (d) 7

Q.8 The principal Value of  $\cos^{-1} 1$  is

(a) 0 (b)  $\frac{\pi}{2}$

(c)  $\frac{\pi}{6}$  (d) None of these

Q.9 Points within and on the boundary of the feasible region represents feasible Solutions of the constraints? (True/False)

Q.10 The value of the determinant  $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 4 \\ 1 & 2 & 5 \end{bmatrix}$  is

(a) 0 (b) 1

(c) 2 (d) 4

## Section-B

**Note:** Short answer type questions. Attempt any six questions out of eight question. (6x5=30)

Q.11 Define column Matrix.

If  $A = \begin{pmatrix} 4 & 3 \\ 0 & 1 \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$  and  $C = \begin{pmatrix} 1 & 3 \\ 3 & 1 \end{pmatrix}$ . Find  $A + 2B - 3C$ .

Q.12 Let  $f: N \rightarrow N$  and  $g: N \rightarrow N$  be given by  $f(x) = x^2$  and  $g(x) = 2x + 5$  then show that  $g \circ f \neq f \circ g$ .

Q.13 Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 7x}$

Q.14 If  $Y = \frac{x^2 + 5x + 1}{\sin x}$  Find  $\frac{dy}{dx}$

Q.15 Find the angle between the vectors  $\vec{a} = \hat{i} + \hat{j}$  and  $\vec{b} = \hat{i} - \hat{j} + \hat{k}$

Q.16 Evaluate  $\int \log x dx$ .

Q.17 Find the distance of plane  $2x - 3y + 4z - 6 = 0$  from the origin.

Q.18 Solve the following linear programming problem graphically

Maximise :  $z = 3x + 2y$