

<b>Course:</b>	II PUC
<b>Subject:</b>	Basic Mathematics
<b>Max.Marks:</b>	80
<b>Duration:</b>	3hr

- If  $A = \begin{bmatrix} 2 & -x \\ x & -7 \end{bmatrix}$  then  $A+A' =$ 
  - $\begin{bmatrix} 4 & 0 \\ 0 & 14 \end{bmatrix}$
  - $\begin{bmatrix} 4 & 10 \\ 7 & 4 \end{bmatrix}$
  - $\begin{bmatrix} 4 & 0 \\ 0 & -14 \end{bmatrix}$
  - $\begin{bmatrix} -4 & 0 \\ 0 & -14 \end{bmatrix}$
- How many 3 digit numbers ending with 7 can be formed using the digits 1, 2, 5, 7, 8 digits cannot be repeated.
  - 12
  - 24
  - 20
  - 18
- If A and B are mutually Exclusive events with  $P(A) = \frac{2}{5}$ ,  $P(B) = \frac{1}{7}$ , then  $P(A \cup B)$  is
  - $\frac{7}{35}$
  - $\frac{1}{35}$
  - $\frac{9}{35}$
  - $\frac{19}{35}$
- Negation of  $p \rightarrow q$  is
  - $\sim p \wedge q$
  - $p \wedge q$
  - $p \wedge \sim q$
  - $\sim p \vee q$
- The subtriplicate ratio of 125 : 27 is
  - 5 : 9
  - 25 : 9
  - 9 : 5
  - 5 : 3
- If  $\cos A = \frac{\sqrt{3}}{2}$  then  $\cos 2A$  is
  - $\frac{1}{\sqrt{3}}$
  - $\frac{2}{\sqrt{3}}$
  - $\frac{1}{2}$
  - $\frac{\sqrt{3}}{2}$
- The equation of the parabola whose focus is  $(0, -4)$  is
  - $x^2 = 16y$
  - $x^2 = -16y$
  - $y^2 = 16x$
  - $y^2 = -16x$
- If  $y = \log(\sec x)$  then  $dy/dx$  is
  - $\tan x$
  - $\sec^2 x$
  - $\tan^2 x$
  - $\sec x$

9. Evaluate  $\int (\cos x + e^{2x} + \frac{1}{x}) dx$ .

- a)  $\sin x - \frac{e^{2x}}{2} + \log x + c$  b)  $\sin x + \frac{e^{2x}}{2} + \log x + c$  c)  $\sin x + \frac{e^{2x}}{2} - \frac{1}{x} + c$  d)  $-\sin x + \frac{e^{2x}}{2} + \log x + c$

10. Evaluate  $\int x^2 + 5e^x - \frac{1}{x} dx$

- a)  $\frac{x^3}{3} + 5e^x - \log x + c$  b)  $\frac{x^3}{3} - 5e^x - \log x + c$  c)  $\frac{x^3}{2} + 5e^x + \log x + c$  d)  $2x + 5e^x - x + c$

## II. Match the following

5×1=5

11. i) if  $\left| \begin{matrix} 2x+1 & 3 \\ 2 & 4 \end{matrix} \right| = 0$ , then 'x' is

a) 3

ii) In how many ways can 7 persons be seated in a row

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

if two persons always occupy the end seat

c) -3

iii) The value of  $x$  if  $5:20 = 3:x$

d) 240

iv) The value of  $4\cos^3 10^\circ - 3\cos 10^\circ$  is

e) 12

v) value of  $\lim_{x \rightarrow 0} \frac{e^{-3x}-1}{x}$

f)  $\frac{\sqrt{3}}{2}$

## III. Fill in the blanks by choosing appropriate answer from the given options

$(720, \frac{11}{12}, -\cot x - x + c, \frac{-1}{2} + e, 4, 30, 6)$

5×1=5

12. The value of 'x' if the matrix  $\begin{bmatrix} 1 & 2 & 5 \\ 2 & x & 10 \\ 3 & 0 & -2 \end{bmatrix}$  is singular

13. In how many ways can 3 boys and 4 girls be arranged in a row so that all the three boys are together.

14. The fourth proportion of the 6, 12, 15 is

15. If the length of the latus rectum of the parabola  $x^2 = -6y$  is

16. Evaluate  $\int_0^1 x + e^x dx$

## PART- B

## IV. Answer any SIX questions

6×2=12

17. If  $\begin{bmatrix} 2 & 3 \\ 7 & 5 \end{bmatrix} + \begin{bmatrix} 2 & x-2 \\ y-1 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 7 & 10 \end{bmatrix}$  Find x and y.

18. In how many ways the letters of the word "ACCOUNTANT" be arranged? In how many of them vowels are always together.

19. A box contains 5 defective and 15 non defective bulbs. Two bulbs are chosen at random. Find the probability that both the bulbs are non-defective.

20. If  $x:y = 3:4$  find  $\frac{2x^2+3y^2}{x^2+y^2}$ .

21. The bankers discount and true discount on a sum of money due 3 months are ₹154.50 and ₹150 respectively. Find the sum of money and the rate of interest.

22. Find the equation of latus rectum and ends of latus rectum of the parabola  $y^2 = -8x$

23. Find  $dy/dx$  if  $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \infty}}}}$  .

24. The radius of sphere is increasing at the rate of 0.5cm/s. Find the rate of increase of its volume when radius is 1.5cm.

25. Evaluate  $\int \frac{3^x \log 3}{(3^x + 5)^7} dx$

### PART -C

**V. Answer any SIX of the following questions**

**6×3=18**

26. Find A and B if  $2A + B = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 4 & 0 \end{bmatrix}$  and  $3A + 2B = \begin{bmatrix} 4 & 6 & 1 \\ 2 & 3 & 5 \end{bmatrix}$

27. A man has 10 relatives, 4 of them all ladies, 3 gentlemen and 3 children. In how many ways can he invite 17 relatives to dinner party so that

(i) there are exactly 2 ladies, 3 gentlemen and 2 children

(ii) there are exactly 2 gentlemen and atleast 3 ladies

28. If ₹120 maintains a family of 4 persons for 30 days. How long ₹300 maintain a family of 6 persons?

29. A bill for ₹14,600 at 3 months after date was discounted on 11-11-99 for ₹ 14,320. If the discount rate is 20%p.a. On what date was the bill drawn?

30. A person invested 4200 partly in 5% stock at 125 and the remaining in 7.5% stock at 75. If income derived from the two stocks is the same. Find the respective investments in each stock. Also find the total income.

31. The price of T.V set inclusive of sales tax of 9% is ₹13,407. Find its marked price. If the S.T is increased to 13% how much more does the customer pay for the T.V.

32. Find the maximum and minimum value of  $f(x) = 9x^2 + 12x + 2$ .

33. Evaluate  $\int \frac{3x}{5x-1} dx$

34. Evaluate  $\int x^2 e^x dx$

### PART -D

**VI. Answer any FOUR following question**

**5×4=20**

35. Solve the system of linear equations using matrix method

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

$$2x - 3y = -3$$

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

36. Resolve  $\frac{3x+4}{(x+1)^2(x-1)}$  into partial fractions.

37. Examine whether the propositions  $p \vee (q \wedge r)$  and  $(p \vee q) \wedge (p \vee r)$  are logically equivalent or not.

38. An aircraft manufacturer supplies aircraft engines to different air lines. They have just completed an initial order of 30 engines involving a total of 6000 direct labour hours at ₹20 per hour. They have been asked to bid for a prospective contract for a supply of 90 engines. It is expected that there will be 80% learning effect. Estimate labour cost for the new order.

39. Solve the LPP graphically

Minimise  $z = 3x + 5y$  subject to the constraints

$$x + 3y \geq 3$$

$$x + y \geq 2$$

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

40. P.T  $\frac{\cos 7x + \cos 3x - \cos 5x - \cos x}{\sin 7x - \sin 3x - \sin 5x + \sin x} = \cot 2x$

41. If  $y = (x + \sqrt{a^2 + x^2})^n$  then show that  $(a^2 + x^2) y_2 + xy_1 - n^2 y = 0$

### PART-E

#### VII. Answer the following questions

42. Prove that  $\lim_{x \rightarrow a} \left[ \frac{x^n - a^n}{x - a} \right] = na^{n-1}$  for all rational values of  $n$

(6 MARKS)

OR

Show that the points are concyclic  $(2,0), (-1,3), (-2,0)$  and  $(1,-1)$

43. An aeroplane when flying at a height of 2000 metres passes; vertically above another plane at an instant when their angles of elevation from the same point of observation are  $60^\circ$  and  $45^\circ$  respectively. Find the distance between the aeroplanes.

(4 MARKS)

OR

Find the value of  $(98)^4$  using binomial theorem.