

Part - I

I. Choose the correct answer.

$$\frac{(-1)^n}{2^n}$$

20 x 1 = 20

- The three terms of sequence having  $a_n = \frac{(-1)^n}{2^n}$ 
  - $-1; \frac{1}{2}; -\frac{1}{3}$
  - $-\frac{1}{2}; \frac{1}{4}; \frac{1}{8}$
  - $-\frac{1}{2}; \frac{1}{4}; -\frac{1}{8}$
  - $\frac{1}{2}; \frac{1}{4}; \frac{1}{8}$
- Fibonacci series was invented by
  - Leonardo Pisa
  - Ramanujam
  - demorire
  - Euler's
- $1^2 + 2^2 + 3^2 + \dots + 10^2 = 385$  then  $2^2 + 4^2 + 6^2 + \dots + 20^2$  is
  - 770
  - 1150
  - $385 \times 385$
  - 1540
- If  $t_1 = n; t_2 = n + 1; t_3 = n + 2$  and so on then  $t_n$  is
  - n
  - $2n + 1$
  - $2n - 1$
  - $2n$
- The ratio of radii and the ratio of heights of two cylinders are 1 : 4. The ratio of their volume is
  - 1 : 10
  - 1 : 4
  - 64 : 1
  - 1 : 64
- The ratio of the volumes of three solids namely cylinder, cone and hemisphere having equal base area and height is
  - 1 : 3 : 2
  - 3 : 1 : 2
  - 2 : 3 : 1
  - 1 : 2 : 3
- The base circumference of a cone is 100 cm and its slant height is 10 cm. Then its CSA is
  - 1000 sq.cm
  - 50 sq.cm
  - 500 sq.cm
  - 110 sq.cm
- $A \cap B^c$  is
  - $A - B$
  - $A + B$
  - $B - A$
  - $A^c \cap B$
- A is a subset of B then the complement of A in B is
  - $A - B$
  - $B - A$
  - $A \cap B$
  - AUB
- A comet is heading for Jupiter with acceleration  $a = 50 \text{ kms}^2$ . The velocity of the comet at time "t" is given by  $f(t) = at^2 - at + 1$ . Then the velocity at time  $t = 5$  seconds is
  - $900 \text{ kms}^{-1}$
  - $1001 \text{ kms}^{-1}$
  - $2001 \text{ kms}^{-1}$
  - $50 \text{ kms}^{-1}$
- $f(x) = 3x + 5$   $g(x) = 2x + m$  if  $f \circ g = g \circ f$  then "m" is
  - $\frac{5}{2}$
  - $\frac{2}{5}$
  - 6
  - 5
- $f: N \rightarrow n$  is given by  $f(x) = 2x + 1$  then 'f' is
  - Into function
  - ONTO function
  - NOT a function
  - constant
- The difference between CI and SI on Rs.6000 for 2 years at 4% p.a is
  - Rs.19.20
  - Rs.9.60
  - Rs.4.80
  - Rs.12.40
- A recurring deposit Rs.40 pm at 8% SI will fetch at the end of 5 years an interest of
  - Rs.800
  - Rs.488
  - Rs.320
  - Rs.240
- The quarterly interest due on Rs.1000 at 12% is
  - Rs.120
  - Rs.40
  - Rs.30
  - Rs.60
- If the roots of  $5kx^2 - (5 + k)^2x + (5 + k)^2 = 0$  are 2, 3 then k is
  - 4
  - 2
  - 5
  - 9
- LCM of  $(1 - x^3)$  and  $(1 - x^2)$  is
  - $x - 1$
  - $1 - x$
  - $1 + x + x^2$
  - $(1 + x + x^2)(1 - x^2)$
- If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - 7x + 8 = 0$  then  $\frac{1}{\alpha} + \frac{1}{\beta}$  is
  - $\frac{8}{7}$
  - $\frac{7}{8}$
  - 7
  - 8
- $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$ 
  - $a^2 = b^2$
  - $b^2 = a^2$
  - $a + b$
  - 1
  - 1
- If one root of the equation is the reciprocal of the other root of  $ax^2 + bx + c = 0$ 
  - $a = b$
  - $a = c$
  - $b = c$
  - $c = 0$

Section – B (Answer any 10)

10 x 2 = 20

- $S_n$  of a series is  $3n^2 + 4n$ . Prove that it is an A.P
- Which term of the sequence  $24, 23\frac{1}{4}, 22\frac{1}{2}, 21\frac{3}{4}, \dots$  is the first negative term?
- The value of  $\sqrt[3]{25} \sqrt[3]{25} \sqrt[3]{25} \dots$
- How many litres of water can be stored in a hemisphere of radius 10.5 dm.
- Two cones have their radii ratio 2 : 5 and their heights ratio 5 : 2. Find the ratio of their volumes.
- The TSA of a cylinder is 338.25 sq.cm and its diameter is 10.5 cm. Find its height
- $f(x) = 3x - 2$   $g(x) = 2x^2$  find fog and gof what do you find?

28.  $f(x) = \frac{4x}{x+1}$  with domain  $\{-3, -2, 0, 1, 1, 3\}$  find the range. Name the type of function.
29.  $U = \{x : 20 \leq x < 28, x \in \mathbb{N}\}$   $A = \{x : 20 \leq x \leq 24, x \in \mathbb{N}\}$   $B = \{26, 27, 28\}$  Verify  $A - B = A \cap B^c$
30. A man invested Rs.20000 in a bank with 8% p.a for 2 years. Which is better for him CI or SI?
31. Muthu deposits Rs.200 pm in RD which gives 6% SI for 5 years. How much will he get at the end of the period?
32. If  $ax^3 + 3x^2 - 13$  and  $2x^3 - 5x + a$  leaving the same remainder when divided by  $(x + 2)$  find "a"
33. Factorize  $x^3 + 3x^2 - 4x - 12$
34. If  $\alpha$  and  $\beta$  are the roots of the equation  $3x^2 - x - 4 = 0$  find the value of  $\frac{1}{\alpha} + \frac{1}{\beta^2}$
35. Simplify  $\frac{1}{x-2} + \frac{1}{x+3}$   
 $\frac{1}{x^2 - 7x + 10} \quad \frac{1}{x^2 - 2x - 15}$

**Part – II Section – C (Answer any two)**

**2 x 5 = 10**

36. If  $a^2, b^2, c^2$  an A.P. Show that  $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$  are also in A.P
37. Find the sum to "n" terms of the series  $7 + 77 + 777 + \dots$  n terms
38. The sum of cubes of certain natural numbers is 3025. Find the numbers.

**Section – D (Answer any three)**

**3 x 5 = 15**

39. Using Membership table prove  $A - (B \cup C) = (A - B) \cap (A - C)$
40.  $f(x) = x^2 - 1$   $g(x) = x + 1$   $h(x) = 1 - x$  verify the composition of function is associative.
41. Find the difference between CI and SI for 3 years at 10% for the amount of Rs.6000.
42. Sita invests Rs.25 in a bank at the beginning of every month for 36 months. If she gets Rs.1066.50 at the end of 36 months find R%

**Section – E (Answer any two)**

**2 x 5 = 10**

43. Through a pipe of diameter 14 m water flows uniformly at the rate of 12 km/hr how much water will flow through it in 15 minutes?
44. A hemispherical bowl has volume of  $\frac{2}{3} \pi$  cu.cm External radius is 5 cm. Find its thickness.
45. A toy is in the form of a hemisphere surmounted by a cone. Radius is 7 cm and slant height of cone is 11 cm. Find its TSA

**Section – F (Answer any three)**

**3 x 5 = 15**

46. If  $x^3 + ax^2 + bx + 6$  has  $(x - 2)$  as a factor and leaves a remainder 3 when divided by  $(x - 3)$  find "a" and "b"
47. Decompose into partial fraction  $\frac{x-1}{(x+3)(x+4)(3x+2)}$
48. If  $\frac{1}{x^4} - \frac{6}{x^3} + \frac{13}{x^2} + \frac{a}{x} + b$  is a perfect square find "a" and "b"
49. If  $\alpha$  and  $\beta$  are the roots of the equation  $3x^2 - 6x + 1 = 0$  form the equation whose roots are  $2\alpha + \beta$  and  $2\beta + \alpha$

**Section – G (Answer any one)**

**1 x 10 = 10**

50. Solve graphically  $(x - 3)(2x + 5) = 0$
51. Draw the graph of  $y = x(x + 3)$  and hence solve  $x^2 + 3x - 4 = 0$ .