BCACAC 208

Credit Based III Semester B.C.A. Degree Examination, April 2021
(2019 –20 and Earlier Batches)
BASIC MATHEMATICS

Time : 3 Hours

Max. Marks : 80

Note : Answer **any ten** questions from Part – **A** and **one full** questions from **each** Unit of Part – **B**.

PART – A

(10×2=20)

1. a) If $\log_a \sqrt{2} = 1/6$, find the value of a.

   b) Find the distance between the points (5, 7) (2, 11).

   c) Write binomial theorem.

   d) Represent the following angles in radians.

      i) 45°   ii) 225°

   e) Define the limit of a function.

   f) If $y = 2x + x^2$ what is $\dfrac{dy}{dx}$?

   g) Integrate $(x^2 - 1)^2$.

   h) Represent the following using Venn diagram.

      i) $A \cup B$ ii) $A - B$

   i) Define null set and universal set.

   j) Define equivalence relation.

   k) Define digraph with an example.

   l) Define isomorphic graphs with example.

P.T.O.

PART – B

Unit – I

2. a) i) Solve for x if $\log_8 x + \log_4 x + \log_2 x = 11$.

 ii) Prove that the points (6, 6), (2, 3) and (4, 7) form a right-angled triangle.

 b) Find the equation of straight line passing through the point (−1, 2) perpendicular to the line $4x − 3y + 7 = 0$.

 c) Define circle. Find the coordinates of the center and the length of radius of $x^2 + y^2 + 7x − 9y − 20 = 0$.   (6+4+5)

3. a) Prove that $\dfrac{\log \sqrt{27} + \log \sqrt{8} - \log \sqrt{125}}{\log 6 - \log 5} = \dfrac{3}{2}$.

 b) i) In a paper on advanced accounts, ten questions are set. In how many different ways an examinee can choose 7 questions ?

 ii) Find the 11ᵗʰ term in the expansion of $(y + 4x)^{30}$.

 c) Find the coordinates of the point which divides externally the line joining (3, 5) and (2, 4) in the ratio 4:3.   (4+6+5)

Unit – II

4. a) i) If $\tan\theta = \dfrac{4}{5}$, find the value of $\dfrac{2\sin\theta + 3\cos\theta}{4\cos\theta + 3\sin\theta}$.

 ii) Reduce $36^g\ 32'\ 50''$ to the sexagecimal measure.

 b) Evaluate $\lim\limits_{x\to 2} \dfrac{2x^2 - 7x + 6}{5x^2 - 11x + 2}$.

 c) Integrate $(x^3 + 2)^{1/2}$.   (6+5+4)

5. a) i) If $\sin\theta = \dfrac{8}{17}$ find $\dfrac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}$.

 ii) Express both in degrees and radians the angles of a triangle whose angles are to each other as 1:2:3.

 b) Differentiate $\dfrac{x^2 + 4}{3x - 7}$ with respect to x.

 c) Find the value of $\int_2^4 (9x^2 - 12x + 4)dx$.   (6+4+5)

Unit – III

6. a) $A = \{\alpha, \beta\}$ and $B = \{1, 2, 3\}$, find A^2, B^2, $A^2 \times B$, $A \times B$ and $B \times A$.

b) Let $f(x) = x + 2$, $g(x) = x - 2$ and $h(x) = 3x$ for $x \in R$, R is a set of real numbers. Find fog, fof, gog, gof and fo(hog).

c) Given the relation matrices

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \quad M_S = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

Find $M_{R \circ S}$, $M_{\tilde{R}}$, $M_{\tilde{S}}$, $M_{\widetilde{R \circ S}}$ and show that $M_{\widetilde{R \circ S}} = M_{\tilde{S}} \circ M_{\tilde{R}}$. (5+5+5)

7. a) $A = \{1\}$ $B = \{a, b\}$ $C = \{2, 3\}$ write A^2, B^2, $A \times B \times C$, $C^2 \times A$.

b) Let $x = \{1, 2, 3\}$ f, g, h and s are the functions from X to X given by

$f = \{<1, 2>, <2, 3>, <3, 1>\}$ $h = \{<1, 1>, <2, 2>, <3, 1>\}$

$g = \{<1, 2>, <2, 1>, <3, 3>\}$ $s = \{<1, 1>, <2, 2>, <3, 3>\}$ Find fog, sos, fohog, sog, and fos.

c) Define surjective, injective and bijective functions with example. (4+5+6)

Unit – IV

8. a) Define the following with suitable example.

i) Multigraph.

ii) Mixed graph.

iii) Cyclic graph.

b) Define tree, root node, leaf node with suitable example.

c) A = {1, 2, 3, 4} and R be a relation on A that has the matrix

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

Construct relational graph of R and write in-degree and out-degrees of all the nodes. (6+4+5)

9. a) Define the following :

   i) in degree

   ii) out degree

   iii) total degree

   iv) parallel edges

   v) isolated vertex.

   b) Explain matrix representation of graph with suitable example.

   c) Convert the following tree into a binary tree. (5+5+5)