BCACAC 208

Credit Based Third Semester B.C.A. Degree Examination, Oct./Nov. 2016
(Common to all Batches)
BASIC MATHEMATICS

Time : 3 Hours

Max. Marks : 80

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

PART – A

1. a) $x = \log_7 27$ $y = \log_5 7$ $z = \log_3 5$ prove that x.y.z = 3.   (10×2=20)

   b) Find the number of permutations of the word "ENGINEERING".

   c) Find the distance between (9, –1) (–2, 10)

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

   e) Define continuity of a function.

   f) Integrate $7x^2 – 3x + 8$ w.r.to x.

   g) Represent i) $\sim(A \cup B)$ ii) B – A.

   h) Write the power set of A = {1, 2, 3}.

   i) Define equivalence relation.

   j) Define a cycle. Give example.

   k) Define simple path.

   l) Define multi graph with an example.

PART – B

Unit – I

2. a) Prove that $\dfrac{\log \sqrt{27} + \log \sqrt{8} - \log \sqrt{125}}{\log 6 - \log 5} = \dfrac{3}{2}$.   (5+4+6)

   b) Show that (2, –2) (8, 4) (5, 7) and (–1, 1) are the vertices of a rectangle.

   c) Expand $\left(\dfrac{x}{3} + \dfrac{2}{y}\right)^4$ using Binomial theorem.

3. a) Find the middle terms in the expansion of $\left(3x - \dfrac{2x^2}{3}\right)^7$. **(5+5+5)**

   b) Evaluate $\log\dfrac{41}{35} + \log 70 - \log\dfrac{41}{2} + 2\log 5$.

   c) Find the coordinates of the point which divides internally and externally the line joining (2, –4) and (7, 1) in the ratio 2:3.

Unit – II

4. a) If $\sin\theta = \dfrac{15}{17}$ and θ is an acute angle find the values of other trigonometric functions. **(5+6+4)**

   b) Find the value of i) $\displaystyle\int_{2}^{4} (3x - 2)^2 \, dx$ ii) $\left(\displaystyle\int_{-1}^{1} \dfrac{1}{x^2} - \dfrac{1}{x^3}\right) dx$.

   c) Evaluate $\displaystyle\lim_{x\to 2} \dfrac{2x^2 - 5x + 2}{x^2 - 3x + 2}$.

5. a) Prove that function $x^2 + 4x - 2$ is continuous at $x = 1$. **(5+5+5)**

   b) Differentiate $9x^4 - 7x^3 + 8x^2 - \dfrac{8}{x} + \dfrac{10}{x^8}$ with respect to x.

   c) If $\sec\theta = \dfrac{13}{5}$ and θ is in the 4th quadrant find the value of $\dfrac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta}$.

Unit – III

6. a) A = {1} B = {a, b} C = {2, 3} write A×B, B², B²×A, A×B×C, C²×A. **(5+5+5)**

   b) A = {x/x is an integer and $0 \leq x \leq 5$}, B = {3, 4, 5, 17} and C = {1, 2, 3}.
   Find : i) A∪B   ii) A∩B   iii) A – B   iv) A – C   v) A∩C

   c) P = {<1, 2>, <2, 4>, <3, 3>} Q = {<1, 3>, <2, 4>, <4, 2>}
   Find D(P), D(Q), D(P∪Q), R(P) and R(P∩Q).

7. a) R = = {<1, 1> <1, 2>, <1, 4>, <2, 1>, <2, 2>, <2, 3>, <3, 2>, <3, 3>, <4, 2>, <4, 4>}.　　　　　　　　　　　　　　　　　　　　　　(5+5+5)

Construct relation matrix of R and draw digraph of R.

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 $f_o g$, $g_o f$, $s_o s$, $f_o h_o g$, $s_o g$, and $f_o s$.

c) Define Surjective, Injective and Bijective functions with example.

Unit – IV

8. a) Explain with suitable example to each terms : Multi graph, Weighted graph and undirected graph.　　　　　　　　　　　　　(5+5+5)

b) Explain binary tree with suitable example.

c) Define the following term with an example :

i) Total degree　　ii) Elementary path　　　　iii) Directed tree　　iv) Length of path.

9. a) Explain the matrix representation of graph with suitable example.　　(4+6+5)

b) With example explain the terms path, reachability and connectedness with example

c) Convert the following tree into a binary tree.