Reg. No. | | | | | | | | | |

BCACAC 208

Credit Based Third Semester B.C.A. Degree Examination, Nov./Dec. 2018
BASIC MATHEMATICS
(Common to All Batches)

Time : 3 Hours Max. Marks : 80

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

PART – A **(10×2=20)**

1. a) Prove that $\log\frac{x}{y}+\log\frac{y}{z}+\log\frac{z}{x}=0$.

   b) Find the value of x if

   i) $\log_5 x = 3$ ii) $\log_a x = 0$.

   c) Find the centre and radius of the circle whose equation is $x^2 + y^2 - 4x + 8y - 5 = 0$.

   d) Find the limit of $\frac{4x^4+3x^2-1}{x^3+7}$ when $x = 1$ and $x = -1$.

   e) If $y = 2x + x^2$, what is $\frac{dy}{dx}$?

   f) Integrate : $3 - 2x - x^4$.

   g) $A = \{2, 4, 6, 7, 9\}$ $B = \{1, 2, 4, 7, 8\}$ find A + B.

   h) Represent $A \cap B$ and $\sim A$ using Venn diagram.

   i) Define reflexive relation. Give example.

   j) Define digraph. Give an example.

   k) Define root and leaf nodes of a tree. Give an example.

   l) Define a loop. Give an example.

P.T.O.

PART – B

Unit – I

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

   b) Find the middle term in the expansion of $\left(x-\frac{1}{2y}\right)^7$.

   c) Find the equation of tangent and normal to the circle $x^2+y^2-6x+8y+17=0$ at $(1,-2)$. **(5+5+5)**

3. a) Evaluate $\log\frac{41}{35}+\log 70-\log\frac{41}{2}+2\log 5$.

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

   c) Show that $(4,-5)$ $(8,1)$ $(14,-3)$ and $(10,-9)$ is a square. **(5+5+5)**

Unit – II

4. a) If $\sec\theta=\frac{13}{5}$ and θ is in the 4th quadrant, find the value of

   $\frac{13\sin\theta+5\sec\theta}{5\tan\theta+6\operatorname{cosec}\theta}$.

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

   c) Prove that $4(\sin^4 30^\circ+\cos^4 60^\circ)-3(\cos^2 45^\circ-\sin^2 90^\circ)-2=0$. **(5+5+5)**

5. a) Prove that $\frac{(\sin 30^\circ+\cos 60^\circ)(\sin 0^\circ+\cot 45^\circ)(\cot 90^\circ+\tan 60^\circ)}{(\tan 45^\circ+\sec 60^\circ)(\operatorname{cosec} 30^\circ+\tan 0^\circ)}=\frac{1}{2\sqrt{3}}$.

   b) Evaluate $\lim_{x\to 2}\frac{2x^2-5x+2}{x^2-3x+2}$.

   c) Evaluate :

   i) $\int(4x^3+3x^2-2x+5)\,dx$

   ii) $\int_6^{10}\left(\frac{dx}{(x+2)}\right)$. **(5+5+5)**

Unit – III

6. a) R = {<1, 1>, <1, 2>, <1, 4>, <2, 1>, <2, 2>, <2, 3>, <3, 2>, <3, 3>, <4, 2>, <4, 4>}. Construct relation matrix of R and draw diagraph of R.

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

   c) Define surjective, injective and Bijective functions with example. **(5+5+5)**

7. a) 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 $f \circ g$, $g \circ f$, $s \circ s$, $f \circ h \circ g$, and $f \circ s$

   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) $A \cup B$ ii) $A \cap B$

   iii) $A - B$ iv) $A - C$

   v) $A \cap C$.

   c) Given the relation matrices

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

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

Unit – IV

8. a) Define the following with a example for each :

   i) Simple path

   ii) Null graph

   iii) Cyclic graph.

   b) Explain path and reachability with suitable example.

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

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

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

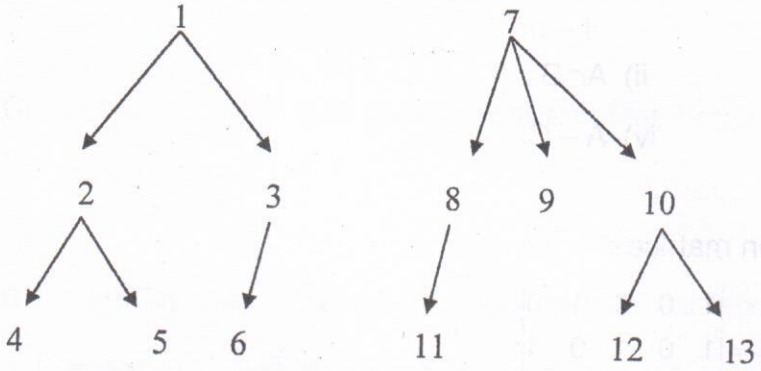
9. a) What are strongly connected and weakly connected graphs ? Explain with suitable examples.

b) Define the following terms with example.

i) out degree of node

ii) length of a path.

c) Convert the following into binary tree



(5+4+6)