**Credit Based Third Semester B.C.A. Degree
Examination, Nov./Dec. 2015
(New Syllabus) (2013-14 Batch Onwards)
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) Prove that $\log \dfrac{x}{y} + \log \dfrac{y}{z} + \log \dfrac{z}{x} = 0$. (10×2=20)

   b) Write binomial theorem.

   c) Find center and radius of a circle whose equation is $x^2 + y^2 - 2x - 6y + 7 = 0$.

   d) Define continuity of a function.

   e) Find $\lim_{x \to 1} \dfrac{4x^4 + 3x^2 - 1}{x^8 + 7}$.

   f) Differentiate $x + \dfrac{4}{x} - \dfrac{2}{x^7}$.

   g) $A = \{2, 3, 4\}$, $B = \{1, 2\}$. Find $A + B$ and $A - B$.

   h) Define reflexive relation. Give an example.

   i) Define disjoint sets. Give example.

   j) Define digraph with an example.

   k) Define length of a path. Give an example.

   l) Define loop. Give an example.

PART – B

UNIT – I

2. a) If $\log\left(\frac{x+y}{7}\right) = \frac{1}{2}(\log x + \log y)$, show that $\frac{x}{y} + \frac{y}{x} = 47$.

b) Expand $\left(x - \frac{1}{x}\right)^5$ using Binomial theorem.

c) Show that (8, 3) (2, –1) (0, 1) and (6, 5) are vertices of parallelogram. (5+5+5)

3. a) If log 2 = 0.3010 and log 3 = 0.4771 find the value of $\log \frac{(16)^{\frac{1}{5}}(5)^2}{(108)^3}$.

b) Prove that quadrilateral with vertices (2, –1), (3, 4), (–2, 4) and (–3, 2) is a rhombus.

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

UNIT – II

4. a) If θ is the 4th quadrant and $\cos\theta = \frac{5}{13}$, find the value of $\frac{13\sin\theta + 5\sec\theta}{5\tan\theta + 6\cos\theta}$.

b) Evaluate $\lim_{x \to 2} \frac{2x^2 - 7x + 6}{5x^2 - 11x + 2}$.

c) Differentiate $\frac{x^2 - 1}{x^2 + 1}$ with respect to x. (5+5+5)

5. a) If $\cot\theta = \frac{24}{7}$ find the values of other trigonometric functions.

b) Differentiate $(3x^2 + 5)(2x^3 + x + 7)$ with respect to x.

c) Integrate : i) $\int_2^4 (4x^3 + 3x^2 - 2x + 5)dx$ ii) $\int_6^{10} \frac{dx}{(x+2)}$ (5+5+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) For the relation $R = \{(1, 2)\ (3, 4)\ (2, 2)\}$, $S = \{(4, 2)\}$ obtain the relation matrix of RoS and SoR.

   c) Draw Venn diagram for

   　i) $B \cap (\sim A)$

   　ii) $A \cap B \neq \phi$

   　iii) $A \cup B$

   　iv) $\sim A$

   　v) $A - B$　　　　　　　　　　　　　　　　　　　　　　　　　　　(5+5+5)

7. a) Let $X = \{1, 2, 3, 4...7\}$ a relation R is defined as $R = \{(x, y)|\ x - y$ is divisible by $3\}$. Show that R is an equivalence relation and draw graph of R.

   b) Define :

   　i) Transitive relation. Give example.

   　ii) Define partial order relation.

   　iii) Define equivalence relation.

   c) Given $A = \{2, 5, 6\}$ $B = \{3, 4, 2\}$ $C = \{1, 3, 4\}$. Show that

   　i) $A - C = A$　　　　　　　ii) $A - B \neq B - A$　　　　　　　(5+6+4)

UNIT – IV

8. a) Define the following terms with an example

   　i) Strongly connected

   　ii) Weakly connected

   　iii) Unilaterally connected

   b) $A = \{1, 2, 3, 4\}$ and R be a relation on A that has 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 indegree and outdegree of all nodes.

   c) Explain matrix representation of graph with suitable example.　　　(6+4+5)

9. a) Define following terms with an example
     i) Cyclic graph
     ii) Acyclic graph
     iii) Isomorphic graph

   b) Illustrating with suitable example to each define the terms path, reachability.

   c) Convert the following tree into binary tree.   (6+4+5)

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