Reg. No. ☐☐☐☐☐☐☐

BCACAC 208

III Semester B.C.A. Degree Examination,
October/November 2019

(Credit Based Semester Scheme)

(Common to All Batches)

MATHEMATICS

Basic Mathematics

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　[Max. Marks : 80

Instructions : *Answer **any ten**. questions from Part A and one full question from each unit from Part B.*

PART – A

1. Answer **any ten** questions :　　　　　　　　　**(10 × 2 = 20)**

    (a) Change into exponential form
        (i) $\log_4 64 = 3$
        (ii) $\log_{\sqrt{2}} 16 = 8$

    (b) Find the number of permutations of the word ASSASSINATION.

    (c) Find the distance between (-4, -2) and (3, -5).

    (d) Express in radian
        (i) $60°$
        (ii) $135°$

    (e) Differentiate $7x^4 + 3x^3 - 9x + 5$ with respect to x.

    (f) Integrate $2x - x^4$

    (g) Define proper subset. Give example.

    (h) Given $A = \{2,3,4\}$ $B = \{4,5,6\}$. Find B + A.

    (i) Represent the following using Venn diagram
        (i) $A \cup B$
        (ii) B-A

    (j) Define weighted graph with example.

    (k) Define mixed graph with example.

    (l) Define a binary tree with example.

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PART – B

UNIT – I

2. (a) Without using log table solve $\log\dfrac{81}{8} - 2\log\dfrac{3}{2} + 3\log\dfrac{2}{3} + 3\log\dfrac{3}{4}$

   (b) Expand $\left(\dfrac{3x}{4} + \dfrac{4}{3x}\right)^5$ using Binomial theorem.

   (c) Show that the points $(4, 3)(7, -1)$ and $(9, 3)$ are the vertices of a isosceles triangle.

   (d) Find the equation of the circle whose centre is $(4, 5)$ and passing through the centre of the circle $x^2 + y^2 + 4x + 6y - 12 = 0$

(4 + 4 + 4 + 3)

3. (a) If $\log 2 = 0.3010$ and $\log 3 = 0.4771$ what is $\log\left(\dfrac{16^2 5^2}{108^3}\right)$?

   (b) In a mercantile firm, 4 posts fall vacant and 35 candidates apply for posts. In how many ways can a selection be made?
      (i)   If one person is always include
      (ii) If one person is always excluded.

   (c) Find the middle term in the expansion of $\left(\dfrac{4x}{5} - \dfrac{5}{2x}\right)^8$.

   (d) Find the co-ordinates of the point which divides externally the line joining $(4, 7)$ and $(1, -2)$ in the ratio $5 : 2$.   **(4 + 4 + 4 + 3)**

UNIT-II

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

   (b) Evaluate $\lim_{x\to 0}\left(\dfrac{4x^2 + 5x^3 + 7x^2 + 6x}{5x^5 + 7x^2 + x}\right)$

   (c) Prove that the function $x^2 + 4x - 2$ is continuous at $x = 1$.

   (d) Find the value of $\int_{2}^{4}(3x - 2)^2 dx$.   **(4 + 3 + 4 + 4)**

5. (a) If $\cos\theta = \dfrac{24}{25}$ and θ is an acute angle find the values of other trigonometric functions.

(b) Evaluate $\lim_{x\to 2}\dfrac{x^2 - x - 2}{x^2 - 5x + 6}$

(c) Differentiate $\dfrac{3x^2 + 5x}{7x + 4}$ with respect to x.

(d) Prove that $4\left(\sin^4 30^0 + \cos^4 60^0\right) - 3\left(\cos^2 45^0 - \sin^2 90^0\right) - 2 = 0$

(4 + 4 + 4 + 3)

UNIT-III

6. (a) If $X = \{1,2,3,4\}$ and $R = \{(1,1),(1,4),(4,1),(4,4),(2,2),(2,3),(3,2),(3,3)\}$, write the matrix of R and sketch its graph.

(b) $A = \{1,2,3,4\}$ $B = \{a,b,c\}$ $C = \{x,y\}$.

Write $A \times B$, $A \times B \times C$, $B^2 \times A$, $C \times A$, $B \times C$

(c) If $R = \{< 1,2 >< 3,4 >< 2,2 >\}$ $S = \{< 4,2 >< 2,5 >< 3,1 >< 1,3 >\}$ where R and S are relations, write $R \circ S$, $R \circ R$, $S \circ S$, $S \circ R$ and $R \circ (S \circ R)$ **(5 + 5 + 5)**

7. (a) $A = \{x / x$ is and integer and $0 \le x \le 5\}$, $B = \{3,4,5,17\}$ and $C = \{1,2,3\}$.

Find,

(i) $A \cup B$

(ii) $A \cap B$

(iii) $A - B$

(iv) $A - C$

(v) $A \cap C$

(b) 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_S $M_{\overline{R \circ S}}$ and show that $M_{R \circ S} = M_{\tilde{S}} \circ M_{\tilde{R}}$

(c) Define Inverse of function. Show that the functions $f(x) = x^3$ and $g(x) = x^{1/3}$ for $X \in R$ are inverse of one another. **(5 + 5 + 5)**

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