170302

B. Voc Automotive Manufacturing/ Mechatronics

Subject: Applied Mathematics
Subject Code: BSC-101
Semester- 1st Semester, Re-appear (2017-20)
Theory (External): 70
Time: 03 hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. **Section A** comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 2 marks.
3. **Section B** comprises 6 essay type questions out of which students need to do any 5. Each question carries 10 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number					

SECTION –A (OBJECTIVE TYPE QUESTIONS)

(10x2=20 Marks)

1. If A=$\{x: x \text{ is a natural number}\}$,B= $\{2x : x \text{ is a natural number}\}$ and C= $\{2x+1 : x \text{ is a natural number}\}$, then find A∩ B and $A \cup B$.
2. Show that the relation R in the set Z of integers given by R = $\{(a,b): 2 \text{ divides } a-b\}$ is symmetric and transitive .
3. A room has 6 doors. In how many ways can a man enter the room through one door and come out through different doors?
4. If there are 20 persons in a party and if each of two of them shake hands with each other, how many hands shakes happen in the party?
5. Find the angle between the minute hand of a clock and the hour hand of a clock when the time is 7.20 .
6. Eliminate θ from the following equations: x= a cos θ and y = a sin θ.
7. Find the minor of -2 and -4 in the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 1 & -2 & 2 \\ 3 & 2 & 4 \end{bmatrix}$.

8. Find the rank of the square matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

9. Find the derivative of the function x^x with respect to x.

10. Evaluate the integral: $\int (\frac{x}{a} + \frac{a}{x} + x^a + a^x)dx$.

SECTION –B (ESSAY TYPE QUESTIONS)

(5x10=50 Marks)

1. (a) In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find (i) how many drink tea and coffee both (ii) how many drink coffee but not tea.

   (b) Find the domain and range of the functions: (i) $\sin^{-1} 2x$ (ii) $\frac{x}{x^2-3x+2}$.

2. (a) Evaluate $\lim_{x\to 0} \frac{tan\ 3x-2x}{3x-sin^2 x}$.

   (b) Discuss the continuity of the function f defined by

$$f(x) \begin{cases} x-2 \ if \ x>1 \\ x+2 \ if \ x \leq 1. \end{cases}$$

3. a) From a class of 25 students, 10 are to be choosen for a party. There are 3 students who decide that either all of them will join or none of them join. In how many ways they can be choosen?

   (b) Find the term independent of x in the expansion $\left(2x - \frac{1}{x} \right)^{10}$

4. (a) Prove that $\frac{Sin\ 11A\ Sin\ A+Sin\ 7A\ Sin\ 3A}{Cos\ 11A\ Sin\ A+Cos\ 7\ A\ Sin\ 3A} = tan\ 8A.$

   (b) If a=15,b=36, c=39 , find $\tan \frac{A}{2}$.

5. Find the inverse of matrix by adjoint method $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 3 \\ 1 & -2 & 1 \end{bmatrix}$.

6. a) Find the derivative of the following functions.(i) $\frac{\sin(ax+b)}{\cos(cx+d)}$ (ii) $\log(\cos\ e^{2x})$.

   (b) (i) $\int x \log x\, dx$ (iii) $\int_0^{\frac{\pi}{2}} \sin\ \theta\ cos^4\ \theta\ d\theta$

--------END OF THE PAPER--------