B. Voc Automotive Manufacturing/ Mechatronics

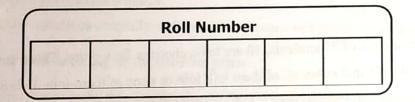
Subject: Applied Mathematics Subject Code: BSC-101

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



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 $A\cap B$ 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: $x = a \cos \theta$ and $y = a \sin \theta$.
- 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

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

- 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 $\left(\begin{array}{cc} 2x \frac{1}{x} \end{array}\right)^{10}$
- 4. (a) Prove that $\frac{\sin 11A \sin A + \sin 7A \sin 3A}{\cos 11A \sin A + \cos 7A \sin 3A} = \tan 8A.$
 - (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-----