

Attempt any **FOUR** Questions, selecting at least **ONE** from each section.  
 All questions carry equal marks

### SECTION I

- 1- a) Write a C++ program to evaluate the integral  $\int_a^b \sqrt{x} dx$  using Trapezoidal Rule. Use  $a = 1$ ,  $b = 2$  and  $n = 4$ . 8
- b) Write a C++ program to calculate the area and circumference of a circle. The program should take 10 values for radius from the user. 4.5
- 2- a) Write a program in C++ for the factorial of a number by taking the number from the user using any loop structure. 6
- b) Write a C++ program for current and power if we have the following values of voltage and resistance: 6.5

Voltage	10	15	20	25	30
Resistance	100	125	140	165	190

- 3- a) Write a program to find out five values of  $f(x) = 7x^2 - 15x + 5$  by reading five values of  $x$  from user, using function. Also calculate the sum of  $f(x)$ . 6
- b) Write a program for calculating equivalent resistance of 'n' resistances connected in series, by taking the value of 'n' from user, where 'n' is the number of resistances connected in series. 6.5

### SECTION II

- 4- a) Write a MATLAB program, using Matrix method for solving the following equations simultaneously: 6
- $$\begin{aligned} 2x + 3y - 9z &= -55 \\ -7x - 5y + 3z &= 30 \\ 5x + 6y + 4z &= 15 \end{aligned}$$
- b) Write a MATLAB program to plot different points at random to generate graph for a particle describing Brownian motion. Also calculate total distance and average distance traced by the particle. Draw approximate output graph with proper labels. 6.5
- Note: The rand ( ) function can be used to generate a point in x – y plane.
- 5- a) Write a MATLAB program to find out the Corresponding Height, Average Height, Maximum Height and Minimum Height for  $h = \frac{1}{2} gt^2$  using arrays. Where values of time = 12, 23, 10, 9, 24 and value of  $g = 9.8 \text{ m/s}^2$  7
- b) Write a MATLAB program to display even numbers along with their sum from 100 to 200 using for loop. 5.5
- 6- a) Write a MATLAB program for multiplying two  $3 \times 3$  multi-dimensional arrays. 4.5
- b) Write a MATLAB program for studying the power analysis of a simple RL series circuit, using Euler's method plot the values of time against P(power across source),  $P_r$ (power across resistance) and  $P_L$  (power across inductance).  
 Given that  $r$  (resistance) =  $10\Omega$ ,  $L$  (inductance) =  $10H$ ,  $i$  (initial current) = 0,  $V$  (voltage) = 0.5 volts,  $t$  (initial time) = 0 sec,  $t_{\max}$  (maximum time) = 10 sec  $h$  (time step) = 0.01 sec.  
 Remember that :-  $\frac{di}{dt} = (V - ir) / L$   $i = i + \left(\frac{di}{dt}\right)h$ ,  $t = t + h$ ,  $P_s = i^2 r$   $P = Vi$  and  
 $P_L = iL\left(\frac{di}{dt}\right)$  8
- 7- a) Briefly write about different types of operators used in C++. 4.5
- b) Write down the syntax with examples for the following commands in MATLAB: 8
- max ( )
  - find ( )
  - limit ( )
  - fix ( )