

Use separate answer scripts for Module-I and Module-II

Module-I (Computer Project) : Full Marks – 25

Answer **any one** of the following questions.

Examinees may use FORTRAN or C language for writing a computer program.

1. Write a computer program to compute the following series so that the sum is printed term by term. Hence compute logarithm of the result with base 10. Write down the sum and the logarithm.

$$0.2+0.2\times0.8^2+0.2\times0.8^4+\dots+0.2\times0.8^{12}$$

2. Write a computer program to compute the median of the elements and the mean of the squared elements of the following series. Write down the median and mean.

$$3.2, -0.1, -2.4, 5.6, -8.6, 1.3, -4.2, 5.1, 0.5$$

3. Write a computer program to compute the roots of the following equation. Include all possible cases in the program. Write down the roots.

$$\sqrt{0.6x}+1.8\sqrt{x}+0.7x^{3/2}=0$$

4. Write a computer program to arrange the series in descending order. Then compute sine inverse of the eighth number of the resulting series. Write the two parts of the problem in a single program. Write down the results.

$$0.2, 1.5, -9.2, 2.5, -3.2, 0.5, -5.1, 5.6, -0.4, 1.5, 4.5, -6.3$$

5. Write a computer program to compute  $E = Z - YX$  with the following matrices. Write down the matrix E.

$$\mathbf{X} = \begin{pmatrix} 1 & 2 & -3 \\ 4 & -5 & 6 \\ -7 & 8 & 9 \end{pmatrix}, \quad \mathbf{Y} = \begin{pmatrix} -4 & 1 & -3 \\ 2 & -4 & 1 \\ 3 & 5 & -5 \end{pmatrix}, \quad \mathbf{Z} = \begin{pmatrix} -3 & 2 & 1 \\ 6 & -5 & 4 \\ 9 & 8 & -7 \end{pmatrix}$$

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Module-II (Electronics) : Full Marks-25

Answer **any one** from the following set of four questions:

1.
  - (a) What is an OP AMP? 1
  - (b) What is the pin no. of the output in an OP AMP (IC741)? 1
  - (c) Which is the inverting terminal in an OP AMP(IC741)? 1
  - (d) Which is the non-inverting terminal in an OP AMP (IC741)? 1
  - (e) To which pin of IC 741 , +12V is connected? 1
  - (f) To which pin of IC 741 ,-12V is connected? 1
  - (g) What is the symbol for IC 741. 1
  - (h) How many pins (legs) are there in IC 741? 1
  - (i) Write down the theory of an Inverting OP AMP. 4
  - (j) Draw the circuit diagram for anInverting OP AMP. 4
  - (k) Draw a circuit for Null adjustment. 3
  - (l) From the table containing data given below, draw a graph and calculate the gain. 4+2

Resistances (ohm)		No. of obs.	Input voltage $V_i$ (Volts)	Output voltage $V_o$ (Volts)	Experimental Gain from graph			Theoretical Gain
$R_1$	$R_2$				$\Delta V_o$ (Volts)	$\Delta V_i$ (Volts)	Gain	
1K	10K	1	0.21	-2.10				
		2	0.30	-3.13				
		3	0.47	-4.52				
		4	-0.13	1.27				
		5	-0.31	3.01				
		6	-0.46	4.6				

2.
  - (a) What is an OP AMP? 1
  - (b) What is the pin no. of the output in an OP AMP (IC741)? 1
  - (c) Which is the inverting terminal in an OP AMP (IC741)? 1
  - (d) Which is the non-inverting terminal in an OP AMP (IC741)? 1
  - (e) To which pin of IC 741 , +12V is connected? 1
  - (f) To which pin of IC 741 ,-12V is connected? 1
  - (g) What is the symbol for IC 741. 1

- (h) How many pins (legs) are there in IC 741? 1
- (i) Write down the theory of a Non-Inverting OP AMP. 4
- (j) Draw the circuit diagram for a Non-Inverting OP AMP. 4
- (k) Draw a circuit for Null adjustment. 3
- (l) From the table containing data given below, draw a graph and calculate the gain. 4+2

Resistances (ohm)		No. of obs.	Input voltage $V_i$ (Volts)	Output voltage $V_o$ (Volts)	Experimental Gain from graph			Theoretical Gain
$R_1$	$R_2$				$\Delta V_o$ (Volts)	$\Delta V_i$ (Volts)	Gain	
1K	10K		-0.31	-3.4				
			-0.41	-4.4				
			-0.51	-5.6				
			0.35	3.8				
			0.44	4.8				
			0.64	6.8				

3. (a) What is an OP AMP? 1
- (b) What is the pin no. of the output in an OP AMP (IC741)? 1
- (c) Which is the inverting terminal in an OP AMP (IC741)? 1
- (d) Which is the non-inverting terminal in an OP AMP (IC741)? 1
- (e) To which pin of IC 741, +12V is connected? 1
- (f) To which pin of IC 741, -12V is connected? 1
- (g) What is the symbol for IC 741. 1
- (h) How many pins (legs) are there in IC 741? 1
- (i) Write down the theory of an Adder. 4
- (j) Draw the circuit diagram for an Adder. 4
- (k) Draw a circuit for Null adjustment. 3
- (l) From the table containing data given below, draw a graph and calculate the gain. 4+2

Resistances (ohm)		No. of obs.	Input voltage $V_i$ (Volts)			Output voltage $V_o$ (Volts)	Experimental Gain from graph			Theoretical Gain
$R_1$	$R_2$		$V_1$	$V_2$	$V_i = V_2 + V_1$		$\Delta V_o$ (Volts)	$\Delta V_i$ (Volts)	Gain	
1K	10K	1	0.14	-0.27	-0.13	1.3				
		2	0.22	-0.39	-0.17	1.7				
		3	0.30	-0.55	-0.25	2.6				
		4	0.38	-0.12	0.26	-2.6				
		5	0.30	-0.11	0.19	-1.9				
		6	0.22	-0.11	0.11	-1.1				

4. (a) What is an OP AMP? 1
- (b) What is the pin no. of the output in an OP AMP (IC741)? 1
- (c) Which is the inverting terminal in an OP AMP (IC741)? 1
- (d) Which is the non-inverting terminal in an OP AMP (IC741)? 1
- (e) To which pin of IC 741 , +12V is connected? 1
- (f) To which pin of IC 741 , -12V is connected? 1
- (g) What is the symbol for IC 741. 1
- (h) How many pins (legs) are there in IC 741? 1
- (i) Write down the theory of a Differential Amplifier. 4
- (j) Draw the circuit diagram for a Differential Amplifier. 4
- (k) Draw a circuit for Null adjustment. 3
- (l) From the table containing data given below, draw a graph and calculate the gain. 4+2

Resistances (ohm)		No. of obs .	Input voltage $V_i$ (Volts)			Output voltage $V_o$ (Volts)	Experimental Gain from graph			Theoretical Gain
$R_1$	$R_2$		$V_1$	$V_2$	$V_i = V_2 - V_1$		$\Delta V_o$ (Volts)	$\Delta V_i$ (Volts)	Gain	
1K	10K	1	0.14	-0.17	-0.31	-3.2				
		2	0.22	-0.29	-0.51	-5.05				
		3	0.34	-0.35	-0.69	-6.9				
		4	-0.58	0.12	0.70	6.9				
		5	-0.30	0.11	0.41	4.1				
		6	-0.22	0.11	0.33	3.2				