3rd EC/Q.P/Rs. 50/-

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16EC32

Third Semester B.E. Semester End Examination, Dec/Jan 2018-19

ANALOG ELECTRONICS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Each Full Question Carries 20 Marks.*
2. *UNIT-II and UNIT-IV are compulsory.*
3. *Answer any one full question from each remaining units.*

UNIT – I L CO PO M

1 a. Analyse the clipper circuit shown in Fig. Q1(a) and sketch the transfer characteristics. Further sketch the output waveform assuming $V_1 = 3V$ and $V_2 = 5V$ and $V_i = 10\sin wt$. Assume ideal diodes.

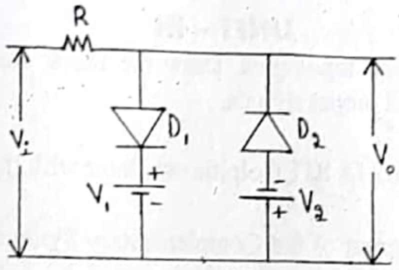

Fig.Q1(a)

(3) (1,2) (1,4) (10)

b. Explain the following terms as applied to a semiconductor diode:
i) Transition or Depletion capacitance
ii) Diffusion capacitance

(2) (1) (1) (05)

c. For the emitter bias network shown below in Fig.Q1(c), with $V_{BE} = 0.7V$ and $\beta = 60$, determine
i) I_B and I_C
ii) V_{CE}
iii) V_C, V_E and V_B

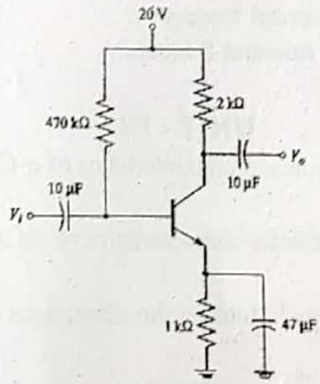

Fig.Q1(c)

(3) (3) (1,4) (05)

OR

2 a. For the voltage divider bias circuit, derive an equation for base current (I_B), collector current (I_C) and collector–emitter voltage (V_{CE}) using exact analysis.

(3) (2,3) (1) (10)

b. Explain Fixed bias circuit, with the help of Base-Emitter loop and Collector Emitter loop equations.

(2) (2,3) (1) (05)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. For the clamper circuit shown below Fig.Q2(c), sketch the output waveform assuming ideal diode.

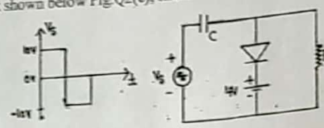

Fig.Q2 (c)

L	CO	PO	M
(3)	(1,2)	(1,4)	(05)

UNIT – II

Q.No.		Question	L	CO	PO	M
3	a.	Derive the expressions for Miller Effect input capacitance and output capacitance.	(2)	(3,4)	(1)	(10)
	b.	Develop r_e model of a transistor in common-base configuration.	(2)	(4)	(1)	(05)
	c.	Write a short note on current mirror circuits.	(2)	(4)	(1)	(05)

UNIT – III

Q.No.		Question	L	CO	PO	M
4	a.	List the four feedback topologies. Draw the block diagram of each feedback topology type and indicate the input and output signals.	(2)	(5)	(1)	(10)
	b.	Explain the operation of a BJT Colpitts oscillator with the help of a circuit diagram.	(2)	(5)	(1)	(05)
	c.	Draw the circuit diagram of the Complementary Symmetry Class B Push-pull power amplifier and explain the working principle.	(2)	(6)	(1)	(05)

OR

Q.No.		Question	L	CO	PO	M
5	a.	Draw the circuit diagram of series-fed Class A power amplifier. Give the expression for DC power input and AC power output and show that efficiency of the amplifier is 25%.	(3)	(6)	(1)	(10)
	b.	Explain the feedback concept with the help of a block diagram.	(2)	(5)	(1)	(05)
	c.	A crystal has the following parameters: L=0.4H, C=0.085pF, C_M=1pF, R=5kΩ i) Calculate the series resonant frequency. ii) Calculate the parallel resonant frequency.	(3)	(5)	(1)	(05)

UNIT - IV

Q.No.		Question	L	CO	PO	M
6	a.	Explain the basic operation and characteristics of n-Channel Depletion type MOSFET.	(2)	(2)	(1)	(10)
	b.	Sketch and explain the transfer characteristics of n-Channel JFET.	(2)	(2,3)	(1)	(05)
	c.	What is CMOS technology? Mention the advantages of CMOS technology	(2)	(2)	(1)	(05)

UNIT -V

Q.No.		Question	L	CO	PO	M
7	a.	Derive the FET small signal model with necessary equations.	(2)	(3,4)	(1)	(10)
	b.	Draw and explain Enhancement-MOSFET small signal ac equivalent model.	(2)	(4)	(1)	(05)
	c.	Draw the circuit of a JFET common-source amplifier and the ac equivalent using small-signal model. Explain in brief.	(3)	(4)	(1)	(05)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

OR

Q.No.		Question	L	CO	PO	M
8	a.	For a JFET common-source amplifier draw the small-signal ac model and derive the expressions for input impedance (Z_i) and output impedance (Z_o).	(3)	(4)	(1)	(10)
	b.	List the advantages of FET.	(2)	(2)	(1)	(05)
	c.	Derive the relation between transconductance (gm) and drain current (I_D).	(3)	(4)	(1)	(05)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

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Third Semester B.E. Makeup Examination, January 2019

ANALOG ELECTRONICS

Time: 3 Hours Max. Marks: 100

Instructions: 1. *Each full question carries 20 Marks.*
2. *UNIT-II and UNIT-IV are compulsory.*
3. *Answer any one full question from each remaining unit.*

UNIT - I

L CO PO M

1 a. Sketch and explain the working of a parallel biased negative clipper circuit. Draw the transfer characteristics and input-output waveforms. Assume ideal diode.
(3) (1) (1,4) (10)

b. Discuss the DC equivalent circuits of a semiconductor diode under forward and reverse bias conditions.
(2) (1) (1) (05)

c. For the fixed bias circuit shown in Fig.Q1(c), determine
i) Collector Current (I_C)
ii) Collector Resistance (R_C)
iii) Base Resistance (R_B)
iv) Collector to Emitter voltage (V_{CE})
Assume β=80, V_{BE}=0.7V

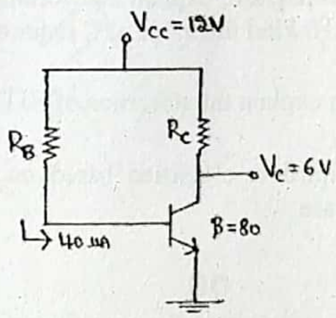

Fig.Q1(c)

(3) (2,3) (1,4) (05)

OR

2 a. For the circuit shown below in Fig.Q2 (a), using silicon transistor and β=80.
i) Find the quiescent base current, collector current and V_{CE}.
ii) Determine the values of collector, emitter and base voltages with respect to ground.
iii) Draw DC load line and locate the Q-point corresponding to β=80.

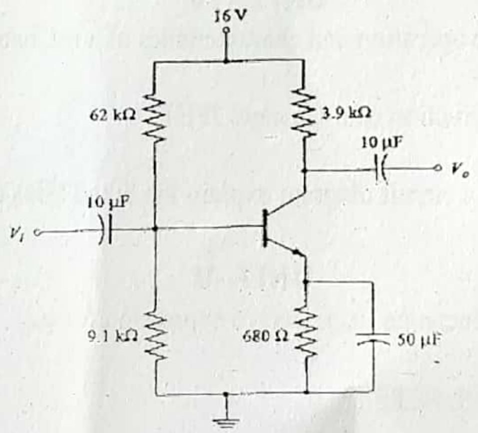

Fig.Q2(a)

(3) (2,3) (1,4) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Explain Emitter bias circuit, with the help of Base-Emitter loop and Collector Emitter loop equations. (2) (2,3) (1) (05)

c. For the clamper circuit shown below Fig.Q2(c), sketch the output waveform for Vi = 10sinwt. Assume ideal diode.

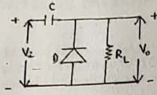

Fig.Q2(c)

L	CO	PO	M
(3)	(1,2)	(1,2)	(05)

UNIT – II

3 a. Starting from a two-port system derive the expressions for the hybrid (h) parameters and sketch the complete hybrid equivalent circuit. (2) (3,4) (1) (10)

b. What is Darlington connection? Explain in brief the biasing arrangement used for the Darlington connection. (2) (2,3) (1) (05)

c. Sketch the frequency response of a RC coupled amplifier and explain the nature of the waveform in the different frequency regions. (2) (3) (1) (05)

L	CO	PO	M

UNIT – III

4 a. With the help of a circuit diagram, explain the working of Hartley oscillator. In a transistor Hartley oscillator, L1 = L2 = 10μH. Find the value of C required for an oscillating frequency of 150KHz. (3) (5) (1) (10)

b. With neat circuit diagram explain the operation of BJT RC phase shift Oscillator. (2) (5) (1) (05)

c. How are the power amplifiers classified based on the location of Q-point? Also indicate the operating cycle in each case. (2) (6) (1) (05)

OR

5 a. Draw the circuit diagram and explain the operation of Class B push pull power amplifier. Also show that maximum conversion efficiency of class B push pull amplifier is 78.5%. (3) (6) (1) (10)

b. For a Transformer-coupled Class A power amplifier draw the DC and AC load line and explain. (2) (6) (1) (05)

c. Explain Barkhausen criteria for sustained oscillations. (2) (5) (1) (05)

L	CO	PO	M

UNIT - IV

6 a. Explain the basic operation and characteristics of a n-Channel depletion-type MOSFET. (2) (2) (1) (10)

b. Explain the construction of n-Channel JFET. (2) (2) (1) (05)

c. With the help of a circuit diagram explain the Fixed-Bias configuration of JFET. (2) (2,3) (1) (05)

L	CO	PO	M

UNIT -V

7 a. Define transconductance (g_m). Derive expression for g_m. (3) (4) (1) (10)

b. Compare BJT with FET. (2) (2) (1) (05)

c. Draw small signal FET model and explain in brief. (2) (3,4) (1) (05)

OR

8 a. For a JFET common-source amplifier draw the small-signal ac model and derive the expressions for voltage gain (Av). (3) (4) (1) (10)

b. Draw and explain Depletion-MOSFET small signal ac equivalent model. (2) (4) (1) (05)

c. With the help of transfer characteristics, obtain the expression for transconductance (gm) using graphical method. (3) (4) (1) (05)

ANALOG ELECTRONICS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Questions in UNIT I and UNIT II are compulsory.*
2. *Solve any one question each from UNIT III to V*

UNIT - I

1 a. Draw and Explain working of a series negative clipper. 06 M
(Level [2], CO [1], PO [1])

b. Explain the operation of positive clamper. 06 M
(Level [2], CO [1], PO [1])

c. Determine the Q point and S for a voltage divider bias circuit with $R_{B1} = 70\ k\Omega$, $R_{B2}=10\ k\Omega$, $R_C = 10\ k\Omega$, $R_E = 1\ k\Omega$. with $V_{CC} = 15$ V, using approximate analysis method. 08 M
(Level [3], CO [1], PO [4])

UNIT – II

2 a. Using r_e model, derive an expression for voltage gain, input and output impedances for voltage divider bias amplifier with emitter bypass capacitor. 06 M
(Level [2], CO [2], PO [1])

b. Determine voltage gain, input and output impedances of a fixed bias amplifier with $h_{ie} = 1.2\ k\Omega$, $h_{fe} = 200$, $h_{oe} = 10\mu S$, $R_B = 1M\Omega$, $R_C = 10\ k\Omega$. 06 M
(Level [3], CO [2], PO [4])

c. Derive an equation for Miller input and output capacitance. 08 M
(Level [2], CO [2], PO [4])

UNIT – III

3 a. Calculate gain, input and output impedances of voltage series negative feedback amplifier having $A = 1000$, $Z_i = 1.5k\Omega$ and $Z_0 = 50\ k\Omega$ for feedback factor $\beta = 0.01$. 06 M
(Level [3], CO [5], PO [4])

b. With neat diagram, explain BJT Colpitts oscillator. Calculate the operating frequency if $C_1 = 0.001\mu F$ and $C_2 = 0.01\mu F$ and $L = 10\mu H$. 06 M
(Level [3], CO [5], PO [4])

c. Derive an expression for gain, input impedance and output impedance of voltage series negative feedback. Mention the advantages and disadvantages of negative feedback. 08 M
(Level [2], CO [5], PO [4])

OR

4 a. Explain the classification of power amplifiers. Also comment on the power dissipation in the transistor. 06 M
(Level [2], CO [6], PO [1])

b. Explain with neat circuit diagram, Class A power amplifier and derive the expression for efficiency. 06 M
(Level [2], CO [6], PO [1])

c. Explain with neat circuit diagram, Class B complementary symmetry power amplifier and derive the expression for efficiency. 08 M
(Level [2], CO [6], PO [1])

UNIT – IV

5 a. Explain the working of FET and draw the characteristics. 06 M
(Level [2], CO [4], PO [1])

b. Determine the value of g_m for a JFET ($I_{DSS} = 8mA$ and $V_p = -6V$) when biased at $V_{GS} = V_p/4$. 06 M
(Level [3], CO [3], PO [4])

c. For a self biased JFET, calculate R_D and R_S with $V_{DD} = 20$ V, $I_{DSS} = 10mA$, $V_{GS} = -3V$ at $I_D = 4mA$. Assume the Q point is at the center of the operating region. 08 M
(Level [3], CO [3], PO [4])

OR

6 a. Explain the working principle of n-channel JFET and draw drain and transfer characteristics. 10 M
(Level [2], CO [3], PO [1])

b. Explain the working principle of n-channel depletion type MOSFET and draw drain and transfer characteristics. 10 M
(Level [2], CO [3], PO [1])

UNIT – V

7 a. Draw the JFET small signal model for given g_{fs} = 2.8 mS and g_{os} = 25 µS. 06 M
(Level [3], CO [5], PO [4])

b. The fixed-bias configuration with an operating point defined by V_{GSQ} = -2.2 V and I_{DQ} = 5 mA, with I_{DSS} = 10 mA and V_P = -8 V.. The value of y_{os} is provided as 30 µS. 06 M
a. Determine g_m .
b. Find r_d .
c. Determine Z_i .
d. Calculate Z_o .
e. Determine the voltage gain A_v .
f. Determine A_v ignoring the effects of rd.
(Level [3], CO [5], PO [4])

c. Determine Z_i, Z_0, and A_V for JFET self bias configuration. 08 M
(Level [2], CO [5], PO [4])

OR

8 a. Differentiate between BJT and FET. 06 M
(Level [2], CO [4], PO [1])

b. Draw the small signal equivalent circuit of a common gate FET amplifier. Derive expressions for input impedance, output impedance and voltage gain. 06 M
(Level [2], CO [4], PO [1])

c. Draw the small signal equivalent circuit of a common drain FET amplifier. Derive expressions for input impedance, output impedance and voltage gain. 08 M
(Level [2], CO [4], PO [1])

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Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

ANALOG ELECTRONICS

Time: 3 Hours Max. Marks: 100

Instructions: 1. *Questions in UNIT I and UNIT II are compulsory.*
2. *Solve any one question each from remaining Units*

UNIT - I

a. Draw and explain the diode equivalent circuit. 05 M
(Level [1], CO [1], PO [1])

b. Explain the operation of positive clamper. Determine V_o for the network of Fig. 1 for the input indicated. 10 M

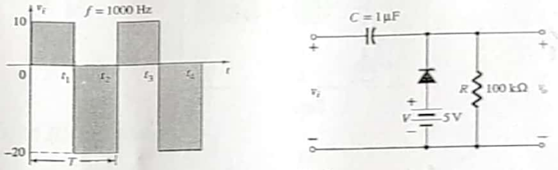

Fig.1

(Level [2], CO [1], PO [1])

c. Derive the expression for stability factor (S) for fixed bias configuration. 05 M
(Level [2], CO [1], PO [1])

UNIT – II

a. Draw r_e and h-parameter models of a transistor in CE mode. Give relation between r_e and h-parameters. 05 M
(Level [2], CO [2], PO [1])

b. Using hybrid model, derive equations for voltage gain, input and output impedances of approximate voltage divider network with emitter bypass capacitor. 07 M
(Level [2], CO [2], PO [1])

c. Derive an equation for Miller input and output capacitance. 08 M
(Level [2], CO [2], PO [1])

UNIT – III

a. Derive an expression for gain, input impedance and output impedance of voltage shunt negative feedback. Mention the advantages and disadvantages of negative feedback. 10 M
(Level [2], CO [5], PO [1])

b. Calculate gain, input and output impedances of voltage series feedback amplifier having A = -500, Z_i = 1.5kΩ and Z_0 = 50 kΩ for feedback factor β = **-1/10** 05 M
(Level [3], CO [5], PO [4])

c. With neat diagram, explain BJT Hartley oscillator. Calculate the operating frequency of BJT RC phase shift oscillator for R = 3 kΩ, C = 1500 pF and R_C=10 kΩ. 05 M
(Level [2], CO [5], PO [4])

OR

a. For distortion readings of D_2 = 0.15, D_3 = 0.01, and D_4 = 0.05, calculate the total harmonic distortion. 05 M
(Level [2], CO [6], PO [1])

b. Explain with neat circuit diagram, Class A transformer coupled power amplifier and derive the expression for efficiency. 07 M
(Level [2], CO [6], PO [1])

c. Explain with neat circuit diagram, Class B push-pull power amplifier and derive the expression for efficiency. 08 M
(Level [2], CO [6], PO [1])

UNIT – IV

5 a. Draw and explain CMOS inverter with neat sketch. (Level [1, CO [4], PO [1])

b. Determine the value of g_m for a JFET (I_{DSS} = 8mA and V_p = -6V) when biased at V_{GS}= $V_p/4$. (Level [3], CO [3], PO [4])

c. For the fixed-bias configuration of Fig.2.
a. Sketch the transfer characteristics of the device.
b. Determine I_{DQ} and V_{DSQ}.

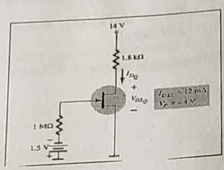

Fig.2

(Level [3], CO [3], PO [4])

OR

6 a. Explain the working principle of n-channel JFET and draw drain and transfer characteristics. (Level [2], CO [3], PO [1])

b. Explain the working principle of n-channel depletion type MOSFET and draw drain and transfer characteristics. (Level [2], CO [3], PO [1])

UNIT – V

7 a. Draw the JFET small signal model for given g_{fs} = 3.8 mS and g_{os} = 20 μS. (Level [3], CO [5], PO [4])

b. Determine Z_i, Z_0, and A_V for JFET fixed bias configuration. (Level [2], CO [5], PO [4])

c. The fixed-bias configuration with an operating point defined by V_{GSQ} = -2 V and I_{DQ} = 5.625 mA, with I_{DSS} = 10 mA and V_P = -8 V. The network is as shown in Fig. 3. The value of y_{os} = 40 μS.

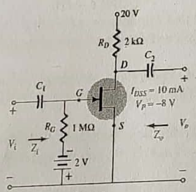

Fig.3

Find the following:
a. Determine g_m .
b. Find r_d .
c. Determine Z_i .
d. Calculate Z_o .
e. Determine the voltage gain A_v .
f. Determine A_v ignoring the effects of r_d .

(Level [2], CO [5], PO [4])

OR

8 a. Give the difference between BJT and FET. 05 M
(Level [1], CO [4], PO [1])

b. Draw the small signal equivalent circuit of a common gate FET amplifier. Derive expressions for input impedance, output impedance and voltage gain. 07 M
(Level [2], CO [4], PO [1])

c. Draw the small signal equivalent circuit of a common drain FET amplifier. Derive expressions for input impedance, output impedance and voltage gain. 08 M
(Level [2], CO [4], PO [1])

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15EC35

Third Semester B.E. Semester End Examination, Nov. / Dec. 2016-17

ANALOG ELECTRONIC CIRCUITS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Answer five full questions*
2. *Unit I and Unit II compulsory*
3. *Answer any one question from each of the remaining units*

UNIT - I

1 a. With neat circuit diagram and waveforms Explain working of biased negative clipper — 05 M
(Level[L2], CO[1], PO[1,9])

b. With neat circuit diagram and waveforms Explain working of biased positive clamper — 05 M
(Level[L2], CO[1], PO[1,9])

c. Explain and Derive expression for Q Point and Stability S for a collector to base bias circuit. — 10 M
(Level[L2], CO[2], PO[1,9])

UNIT – II

2 a. Draw and Explain h-parameter and r-parameter model for Common Emitter configuration amplifier — 10 M
(Level[L2], CO[2], PO[1,9])

b. Design a Common Emitter Amplifier for a voltage gain of 15, handling a maximum output signal swing of 15 V with a stability factor of 20 with lowest frequency of interest of 250 Hz. Calculate the input and output impedance of the designed amplifier. Assume β=100, h_{ie} = 1 kΩ. — 10 M
(Level[L3], CO[3], PO[1,9])

UNIT - III

3 a. Explain the construction and working of n-channel JFET and draw the characteristics — 10 M
(Level[L2], CO[3], PO[1,9])

b. Draw a self bias circuit for a n-channel JFET and derive expression for the Q point — 10 M
(Level[L2], CO[3], PO[1,9])

OR

4 a. Calculate the operating point for a self biased JFET having the supply voltage of V_{DD}=20V, maximum value of drain current I_{DSS} = 10 mA and V_{GS} = -3V at I_D = 4mA. Also determine values of R_S and R_D — 10 M
(Level[L3], CO[3], PO[1,9])

b. Explain the construction and working of different modes of operation in MOSFET with relevant characteristics plots. — 10 M
(Level[L2], CO[3], PO[1,9])

UNIT - IV

5 a. Draw the small signal equivalent circuit of a Common Source FET Amplifier and derive expressions of Gain, Input Impedance and Output Impedance — 10 M
(Level[L2], CO[4], PO[1,9])

b. Draw the small signal equivalent circuit of a Common Gate FET Amplifier and derive expressions of Gain, Input Impedance and Output Impedance — 10 M
(Level[L2], CO[4], PO[1,9])

OR

6 a. Draw the frequency response for a RC Coupled Amplifier and discuss the different regions of operation. Also define the term bandwidth. — 10 M
(Level[L2],CO[4],PO[1,9])

b. Derive an equation for the Miller input and output capacitance. (Level[L2], CO[4], PO[1,9]) 10 M

UNIT -V

7 a. Explain with a block diagram voltage shunt feedback system and derive expressions for Gain, Input Impedance and Output Impedance (Level[L2], CO[5], PO[1,9]) 10 M

b. Discuss Barkhausen criterion for oscillation. Explain the working of a phase shift oscillator. (Level[L2], CO[5], PO[1,9]) 10 M

OR

8 a. Explain working of a Series Fed Class A Power Amplifier and derive expression for the power efficiency (Level[L2], CO[6], PO[1,9]) 10 M

b. Explain working of a Class B Complimentary Symmetry Push-Pull Power Amplifier and derive expression for the power efficiency (Level[L2], CO[6], PO[1,9]) 10 M

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16EC33

Third Semester B.E. Semester End Examination, Dec/Jan 2018-19

DIGITAL ELECTRONICS

ime: 3 Hours

Max. Marks: 100

Instructions: *1. Units III and V are compulsory*
2. Answer any one full question from each of the units I, II, and IV

UNIT - I

		L	CO	PO	M
1 a.	Translate the Boolean function f(a,b,c) = a(b+c')+c into minterms and maxterms.	(2)	(1)	(1)	(06)
b.	Simplify f(a,b,c,d) = ΠM(0,3,4,7,8,10,12,14) +dc(2,6) by applying K map method to obtain minimal SOP equation and implement using only NOR gates.	(3)	(1)	(1)	(08)
c.	Design a logic circuit that has 4 inputs, the output will be high, when the majority of the inputs are low, use K map to simplify.	(3)	(1)	(1)	(06)

OR

		L	CO	PO	M
a.	Apply Quine McCluskey method to the given Boolean function f(a,b,c,d) = Σm (1,2,3,5,6,7,8,9,12,13,15) and obtain prime implicants, essential prime implicants and minimal SOP equation.	(3)	(1)	(1)	(12)
b.	Apply MEV technique to the Boolean function f(a,b,c,d) = Σm(2,3,4,5,13,15) +dc(8,9,10,11) to obtain minimal SOP equation taking least significant bit as MEV.	(3)	(1)	(1)	(08)

UNIT - II

		L	CO	PO	M
3 a.	Explain the concept of BCD addition and hence design the logic circuit using 7483 ICs and suitable gates that adds two single digit BCD and produces BCD sum and carry.	(2)	(2)	(1)	(10)
b.	In certain application, four inputs A,B,C,D are fed to the logic circuit, producing an output F which operates a relay. The relay turns ON when F=1 for the inputs (ABCD): 0000, 0010, 0101, 0110, 1101 and 1110. Design an optimal logic circuit using two 74138 ICs and suitable gate.	(3)	(2)	(1,3)	(10)

OR

		L	CO	PO	M
4 a.	What is the need for look-ahead adder? Explain.	(2)	(2)	(1)	(05)
b.	Write a note on priority encoder.	(1)	(2)	(1)	(05)
c.	Design an optimal logic circuit using a 4x1 MUX that should produce logic-1 output when it detects illegal single digit BCD code. Use most significant variables as select inputs for the MUX.	(3)	(2)	(1,3)	(10)

UNIT - III

		L	CO	PO	M
5 a.	Implement a gated SR latch and write the truth table. Explain its disadvantage.	(2)	(3)	(1)	(07)
b.	Explain the working of a master slave JK Flip flop.	(2)	(3)	(1)	(07)
c.	In an SR latch, output Q is connected to R input while output Q' is connected to S input. Analyze the circuit and draw the timing diagram with respect to clock and identify the functionality of the circuit. Assume SR latch to be cleared initially.	(2)	(3)	(1)	(06)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

USN | | | | | | | | | |

16EC33

Third Semester B.E. Makeup Examination, January 2019

DIGITAL ELECTRONICS

Time: 3 Hours | Max. Marks: 100

Instructions: 1. *Units III and V are compulsory*
2. *Answer any one full question from remaining Units*

UNIT - I

L CO PO M

1 a. List the steps in converting verbal description of the problem statement into truth table and hence convert the following problem statement into truth table:
An electric motor powering a conveyor used to move material is to be turned ON when atleast one of the two operators is in position, if the material to be moved is present, and if the protective interlock switch is not open. Consider operator present, material present as logic-1 and interlock switch not open as logic-1. The motor will be ON when circuit outputs logic-1.Write both theCanonical expressions in m-notation.
(3) (1) (1) (10)

b. A problem statement resulted into the following Boolean function. Simplify using map method for optimality and realize using minimum universal NOR gates only.
$F(a,b,c,d) = \pi(0,6,8,13,14,15) + dc(4,5,10,12)$
(3) (1) (1) (10)

OR

2 a. Apply Quine-McClusky method to simplify the following Boolean function for optimality and realize using minimum universal NAND gates only. $F(w,x,y,z) = \Sigma(1,3,4,5,7,8,9,11,15)$
(3) (1) (1) (10)

b. Apply VEM method and simplify the Boolean function $f(w,x,y,z) = \pi(1,4,5,6,14)$
(3) (1) (1) (10)

UNIT - II

L CO PO M

3 a. Design & implement a 4 bit carry look ahead adder and estimate its propagation delay.
(3) (2) (1) (12)

b. Design and implement a Full adder using IC 74139(2:4 line decoder).
(3) (2) (1,12) (08)

OR

4 a. Design and implement 16:1 Multiplexer using 4:1 Multiplexers.
(3) (2) (1,12) (05)

b. Design & implement 2 bit digital magnitude comparator.
(3) (2) (1) (07)

c. Design & implement 4-2 line Priority Encoder with highest priority assigned to higher order bit. The circuit shall have a validity indicator which should be 1 if the inputs are valid otherwise 0.
(3) (2) (1) (08)

UNIT - III

L CO PO M

5 a. What is the limitation of basic bi-stable element? Explain $\bar{S}\bar{R}$ latch with logic diagram and functic table.
(2) (3) (1) (1

b. Explain, with logic diagram and function table, the asynchronous inputs PRESET and CLEAR edge triggered D flip-flop.
(2) (3) (1)

UNIT - IV

L CO PO M

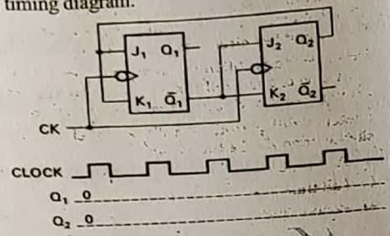
6 a. Explain, with logic diagram, the working of a parallel-in unidirectional shift register.
(2) (4) (1) (08

b. Design a sequential circuit to count the sequence 3→5→6→9→10→12 and repeat. Use positive edge triggered D flip-flops.
(3) (4) (1) (12)

OR

7 a. Analyze the operation of a 4-bit ripple counter with the help of logic diagram and timing diagram.List its advantages and limitations.
(2) (4) (1) (10)

b. Analyze, and complete the timing diagram.



(3) (4) (1) (05

c. Design a mod-6 counter (block diagram only) that counts non-BCD values from 1010 to 1111 and repeat, using IC 74193 (IC74193: 4-bit synchronous binary up/down counter).
(3) (4) (1) (05

UNIT -V

L CO PO M

8 a. Compare Mealy and Moore models of sequential machines
(2) (5) (1) (08

b. Find the equivalence partition for the sequential machine defined by the following state table. Show the standard form of the corresponding reduced machine.

Present State	Next State, z	
	x=0	x=1
A	B,1	H,1
B	F,1	D,1
C	D,0	E,1
D	C,0	F,1
E	D,1	C,1
F	C,1	C,1
G	C,1	D,1
H	C,0	A,1

(3) (5) (1) (1

		L	CO	PO	M

UNIT - IV

6 a. Explain the working of a 4 bit Universal shift register along with mode control table. (2) (4) (1,12)

b. Explain the working of a 4 bit JOHNSON counter with timing diagram. What is the modulus of the counter. (2) (4) (1)

OR

7 a. Compare Synchronous and asynchronous counters (2) (4) (1)

b. Explain the working of a 4 bit ripple DOWN counter. Draw the timing diagram and count table. Use negative edge triggered T flip flops. (2) (4) (1)

c. Design & implement a synchronous counter to count the sequence 0-3-2-5-1-0 using negative edge triggered JK flip flops. (3) (4) (1,12)

		L	CO	PO	M

UNIT -V

8 a. Explain *k*-equivalence in detail and hence define equivalent states. (2) (5) (1)

b. Determine the reduced machine for a machine defined by the following state table and express it in standard form.

Present State	Next State, z x=0	Next State, z x=1
A	B,0	C,0
B	C,0	A,0
C	B,0	G,0
D	G,0	A,0
E	F,1	B,0
F	E,0	D,0
G	D,0	G,0

(3) (5) (1)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

USN

16EC33

Third Semester B.E. Makeup Examination, January 2018
DIGITAL ELECTRONICS

Time: 3 Hours Max. Marks: 100

Instructions: 1. Unit-I and Unit-V are compulsory.
2. Answer any one full question from each of the units II, III, and IV

UNIT - I

1 a. Simplify the given Boolean expression using Quine-McClusky method and realize using universal NAND gates only. $f(w,x,y,z) = \Sigma m(0,2,6,7,8,10,12,13)$. (Level [3],CO [1], PO[1]) 10 M

b. Design an optimal logic circuit using only NOR gates for the given Boolean equation: $f(w,x,y,z) = \prod M(2,5,7,8,10,11,14,15)+dc(0,9,13)$. (Level [3], CO[1], PO [1]) 10 M

UNIT – II

2 a. Design a combinational circuit, using suitable decoder and gate, which generates a logic-1 output when majority of the 3-inputs (x,y,z) are logic-1. Otherwise produces a logic-0 output. (Level[6], CO[2],PO[1,4,12]) 10 M

b. Design a decimal adder with relevant explanation. (Level[3], CO[2], PO[1]) 10 M

OR

3 a. Realize full subtractor using IC 74153 (Dual 4x1 MUX) and suitable gates. (Level[3], CO[2], PO[1]) 08 M

b. Design a 2-bit magnitude comparator using logic gates (Level[3], CO[2], PO[1]) 12 M

UNIT – III

4 a. Demonstrate the use of latch as a switch debouncer with relevant diagrams (Level [3], CO [3], PO [1]) 08 M

b. Explain the operation of gated SR latch with logic diagram and truth table. Identify its limitation. (Level [2], CO [3], PO [1]) 06 M

c. Derive the characteristic equation of JK flip-flop and hence design edge triggered JK flip-flop using edge-triggered D flip-flop (block diagram). (Level [3], CO [3], PO [1]) 06 M

OR

5 a. Explain race-around condition in JK flip-flop with proper timing diagram. (Level [2], CO [3], PO [1]) 05 M

b. Explain catching effect in MS-JK flip-flop with relevant timing diagram. (Level [2], CO [3], PO [1]) 10 M

c. Derive the characteristic equation of T flip-flop and hence design edge triggered T flip-flop using edge-triggered D flip-flop(block diagram). (Level [3], CO [3], PO [1]) 05 M

UNIT – IV

6 a. Explain the working of a 4-bit binary ripple counter with timing diagram. List its advantages and limitations. (Level[2], CO[4], PO[1]) 10 M

b. Explain the operation ring counter and Johnson counter with block diagram and counting sequence. (Level[2], CO[4], PO[1]) 10 M

OR

7 a. Compare ripple and synchronous counters. (Level[2], CO[4], PO[1]) 08 M

b. Design a synchronous mod-6 counter using JK flip-flops that counts the sequence 0→2→3→6→5→1 and repeat. 12 M

(Level[3], CO[4], PO[1])

UNIT – V

8 a. Explain k-distinguishable and k-equivalent states. 04 M

(Level[3], CO[5], PO[1])

b. Derive the reduced (minimal) machine and express in standard form for a completely specified sequential machine defined by the following state table. 16 M

Present State	Next State, z	
	x = 0	x = 1
A	E,0	C,0
B	C,0	A,0
C	B,0	G,0
D	G,0	A,0
E	F,1	B,0
F	E,0	D,0
G	D,0	G,0

(Level[3], CO[5], PO[1])

USN

16EC33

Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

DIGITAL ELECTRONICS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. Unit-I and Unit-V are compulsory.
2. Answer any one full question from each of the units II, III, and IV

UNIT - I

1 a. Applying VEM method, simplify the Boolean expression $f(w,x,y,z) = \Sigma m\ (0,1,2,3,5,7,8,9,10,11,13,14,15)$ and realize using NAND gates. 10 M

(Level[3], CO[1], PO[1])

b. Apply QM method and obtain the minimal SOP expression for the Boolean function $f(a,b,c,d) = \Sigma m\ (0,2,8,10,12,14,15) + dc\ (1,7,9)$ 10 M

(Level[3], CO[1], PO[1])

UNIT – II

2 a. Draw the block diagram of a n-bit ripple adder. Analyze and hence calculate the time taken by the n-bit ripple adder to produce the output. 06 M

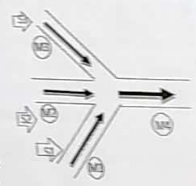
(Level [4], CO [2], PO [1])

b. Design a 8x1 multiplexer using two 4x1 multiplexers. 04 M

(Level [3], CO [2], PO [1])

c. A conveyor system brings raw material in from three different sources. The three sources converge in to a single output conveyor. Sensors mounted adjacent to each source conveyor indicate the presence of raw material. All four conveyors have separate motors so they can be individually controlled. Each source conveyor can have different speed. The output product rate is fixed; it can be only turned on or off. The output product flow rate must match the source flow rates. To accomplish this, the following conditions must be met. 10 M

S3, S2, S1 are the sensors



M1,M2,M3,M4 are the motors

If source1 has the product, then sources 2 and 3 must be turned off; if source1 is empty, then either 2 or 3 or both can be turned on. In the event that no product is available from the sources, the output conveyor must be turned off. If no product is available, the respective source conveyor must be turned off.

Construct the truth table and design the logic circuit to control the motors using suitable decoder IC and gates.

(Level [6], CO [2], PO [1,4,12])

OR

3 a. Design a 4-bit look-ahead adder and estimate its propagation delay. 12 M

(Level [3], CO [2], PO [1])

b. Two motors M_2 and M_1 are controlled by three sensors, S_3, S_2, S_1. One motor, M_2, is to run any time all three sensors are ON. The other motor, M_1, is to run whenever sensors S_2 or S_1, but not both, are ON and S_3 is OFF. For all sensor combinations where M_1 is ON, M_2 is to be OFF, except when all three sensors are OFF then both motors must remain OFF. Design the logic network for motors control using IC 74153 and suitable gates. 08 M

(Level [6], CO [2], PO [1,4,12])

UNIT – III

4 a. Explain NAND latch. Identify its limitation. Show how to overcome the limitation with a modified logic circuit. 10 M
(Level[2],CO[3],PO[1])

b. Draw the logic diagram of edge-triggered D flip-flop and explain its working. 10 M
(Level[2], CO[3], PO[1])

OR

5 a. Derive the characteristic equations of JK and T flip-flops. Construct edge-triggered JK and T flip-flops using edge triggered D flip-flop. 10 M
(Level[4], CO[3], PO[1])

b. Identify the need for master-slave flip-flops. Explain MS-JK flip-flop and mention its limitation. 10 M
(Level[2], CO[3], PO[1])

UNIT – IV

6 a. Distinguish between asynchronous and synchronous counters. 05 M
(Level [2], CO [4], PO [1])

b. Design a synchronous counter using positive edge-triggered T flip-flops to count the sequence 0→2→3→6→7 and repeat. 10 M
(Level [6], CO [4], PO [1,4,12])

c. Design a decade counter using 4-bit binary counter (Only block diagram) and explain. 05 M
(Level [6], CO [4], PO [1,12])

OR

7 a. Draw the block diagram of a 4-bit ring counter and explain its working with a counting sequence. 05 M
(Level [2], CO [4], PO [1])

b. Design a universal shift register using multiplexers and D flip-flops, and explain its operation. 10 M
(Level [3], CO [4], PO [1])

c. Design a BCD down counter using 4-bit binary down counter (Only block diagram) and explain. 05 M
(Level [3], CO [4], PO [1,12])

UNIT –V

8 a. Explain Mealy and Moore models of sequential machines 08 M
(Level [2], CO [5], PO [1])

b. Derive the reduced machine for a sequential machine defined by the following state table 12 M

Present State	Next State, z	
	x=0	x=1
A	E,0	D,1
B	F,0	D,0
C	E,0	B,1
D	F,0	B,0
E	C,0	F,1
F	B,0	C,0

(Level [3], CO [5], PO [1])

USN

15EC36

Third Semester B.E. Semester End Examination, Nov. / Dec. 2016-17

DIGITAL ELECTRONIC CIRCUITS

Time: 3 Hours Max. Marks: 100

Instructions: 1. Unit II and IV are compulsory.
2. Answer any one full question from remaining each units.

UNIT - I

1 a. Translate the Boolean function $f(x,y,z) = \bar{x}(\bar{y}+z)+\bar{z}$ in to canonical SOP form and express in m-notation. 04 M
(Level[L2], CO[1], PO[1])

b. Apply Karnaugh map method and determine the minimal POS expression for the Boolean function $f(w,x,y,z) = \pi M(0,2,4,5,8,13,15) + dc(1,10,14)$ and realize using only NOR gates. 08 M
(Level[L3], CO[2], PO[1])

c. Apply Quine-McClusky method and obtain the minimal SOP expression for the Boolean function $f(w,x,y,z) = \Sigma(4,7,9,11,12,13,14,15)$ 08 M
(Level[L3], CO[2], PO[1])

OR

2 a. Design a combinational circuit using minimum NAND gates that produces logic-1 output when majority of four inputs are logic-1, otherwise produces logic-0 output. 08 M
(Level[L3], CO[5], PO[1])

b. Apply Karnaugh map method and obtain the minimal SOP expression for the Boolean function $f(w,x,y,z) = \Sigma m(1,3,8,9,10,11,12,14,15)$. 08 M
(Level[L3], CO[2], PO[1])

c. Define static hazard. Explain, with an example, how to detect static hazard. 04 M
(Level[L1], CO[1], PO[1])

UNIT – II

3 a. Use IC74xx138 (3-to-8 line decoder) and suitable gates, and realize the Boolean functions $f_1(x,y,z) = \Sigma m(0,1,3,4,7)$, $f_2(x,y,z) = \pi M(4,6,7)$ 06 M
(Level[L3], CO[3], PO[1])

b. Use 8x1 MUX and implement the Boolean function $f(w,x,y,z) = \Sigma m(1,2,4,6,7,9,11,12,15)$ 06 M
(Level[L3], CO[3], PO[1])

c. What is the limitation of ripple adder? Estimate the overall delay of an n-bit ripple adder. Mention the remedy. Mention the overall delay of remedial circuit? 08 M
(Level[L4], CO[3], PO[2])

UNIT - III

4 a. Explain, with logic diagram (using gates) and truth table, the operation of MSJK flip-flop. 08 M
(Level[L2], CO[1], PO[1])

b. Derive the characteristic equation of JK and T flip-flops. 08 M
(Level[L3], CO[1], PO[1])

c. What is the function of register? Explain the classification of registers. 04 M
(Level[L1], CO[1], PO[1])

OR

5 a. Complete the logic diagram shown in **Fig.6(a)** for a NAND latch — 04 M

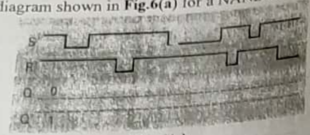


Fig. 6(a)

(Level[L3], CO[1], PO[1])

b. Explain race-around condition that occurs in JK flip-flop. Mention the remedies. — 06 M
(Level[L2], CO[1], PO[1])

c. Explain the operation of universal shift register with neat diagram and mode control table — 10 M
(Level[L2], CO[1], PO[1])

UNIT - IV

6 a. Compare ripple and synchronous counters (On at least five different points). — 05 M
(Level[L2], CO[3], PO[1])

b. Explain Johnson counter. — 05 M
(Level[L2], CO[1], PO[1])

c. Design a synchronous mod-6 counter using T flip-flops that counts sequence $0 \rightarrow 1 \rightarrow 3 \rightarrow 6 \rightarrow 7 \rightarrow 4$ and repeat. — 10 M
(Level[L3], CO[2], PO[1])

UNIT -V

7 a. Draw the circuits of CMOS inverter, CMOS NAND and CMOS NOR gates. — 08 M
(Level[L1], CO[1], PO[1])

b. Explain, briefly, the terms fan-in, fan-out, noise margin and propagation delay. — 08 M
(Level[L2], CO[1], PO[1])

c. Write a note on PLA. — 04 M
(Level[L1], CO[1], PO[1])

OR

8 a. Compare TTL and CMOS logic levels. — 08 M
(Level[L2], CO[1], PO[1])

b. Discuss SRAM. — 06 M
(Level[L1], CO[1], PO[1])

c. Write a note on FPGA. — 06 M
(Level[L1], CO[1], PO[1])

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EC34/16EC34

Third Semester B.E. Semester End Examination, Dec/Jan 2018-19

SIGNALS AND SYSTEMS

Time: 3 Hours — Max. Marks: 100

Instructions: *1. Unit-I and Unit-IV are compulsory.*
2. Answer any one full Question from remaining units.

UNIT - I

		L	CO	PO	M
1 a.	Determine the odd and even parts of the signal x(t) shown in figure Q1(a).	(1)	(1)	(1,2)	(06)

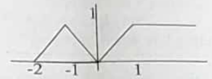

Figure Q1 (a)

b. Given $g(t) = -4 - 2t \quad -2 < t < 0$
$-4 + t \quad 0 < t < 4$
$16 - 2t \quad 4 < t < 8$
Realize g(t) and ½ g(3t). — (2) (1) (1,2) (08)

c. Find the system properties namely, memory, stability, causality, linearity, and time invariance for the following systems.
i) nx(n) ii) $e^{x(t)}$ — (2) (1) (1,2) (06)

UNIT – II

2 a. What do you mean by 'Impulse Response' of a LTI system? Deduce an expression to determine the response of the system for an arbitrary input sequence x[n]. — (2) (2) (4) (07)

b. Obtain convolution sum of x[n] = { 2,-4, 7 , 9, 6 }, h[n] = {-4, 3, 1, 3, 5}.
↑ ↑ — (2) (2) (4) (05)

c. Impulse response of a LTI system is h[n] = u[n], determine it's response for an input $x(n) = \alpha^n u(n)$, where $0 < \alpha < 1$. — (2) (2) (4) (08)

OR

3 a. Perform convolution u(t + 1)*u(t - 2). — (2) (2) (4) (05)

b. Impulse response for an LTI system, h(t) = u(t). Determine the output of the system with an input $x(t) = e^{-\alpha t}u(t)$, where $\alpha > 0$. — (2) (2) (4) (07)

c. Evaluate convolution integral between $x_1(t) = u(t+2) - u(t-1)$ and $x_2(t) = u(-t+2)$. — (3) (2) (4) (08)

UNIT - III

4 a. Check for stability, causality and memory of the LTI system impulse responses,
i) h(n) = 2u(n) – 2 u(n-2) ii) $h(t) = e^{-4|t|}$ — (2) (3) (1,2) (06)

b. Find the forced response of a system described by
$y(n) - 5/6\ y(n-1) + 1/6\ y(n-2) = x(n)$, if $x(n) = 2^n$. — (3) (3) (1,2) (08)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

KLS GOGTE INSTITUTE OF TECHNOLOGY, BELAGAVI

USN

16EC34

Third Semester B.E. Makeup Examination, January 2019

SIGNALS AND SYSTEMS

Time: 3 Hours | Max. Marks: 100

Instructions: 1. Unit-I and Unit-IV are compulsory.
2. Answer any one full Question from remaining units.

UNIT - I

L CO PO M

1 a. Compare following signals
i) Periodic and Aperiodic
ii) Even and Odd
iii) Deterministic and Random
(2) (1) (1) (06)

b. Decide whether following signals are energy signals or power signals. Hence, determine power or energy accordingly.
i) $x[n] = n$, for $0 \le n < 5$
$= 10 - n$, $5 \le n \le 10$
$= 0$, otherwise
ii) $x[n] = (-1)^n$ for all n
iii) $x(t) = t$ for $0 \le t \le 1$
$= 2 - t$ for $1 \le t \le 2$
$= 0$ otherwise
(2) (1) (1) (06)

c. Determine Linearity, Time-invariance and Causality of the following systems
i) $y[n] = 2\,x[n].u[n]$ ii) $y(t) = t\,e^{x(t)}$
(2) (1) (1) (08)

UNIT -II

2 a. Compute the convolution of x(n) = {1, (2), 3 , 1} and h(n) = {(1) , -2, 1} using tabular method. ( ) indicates the position of the origin. Mark the position of the origin in the convoluted value.
(2) (2) (1,2) (06)

b. Plot $x(t) = e^{-2t}$ u(t) and h(t) = u(t+2). Find x(t) * h(t). Plot the convoluted value.
(3) (2) (1,2) (08)

c. If x(n) = 1 0<n <4 and $h(n) = 2^n$ $0 < n < 6$, plot the two signals and the convoluted sum.
(3) (2) (1,2) (06)

OR

3 a. The impulse response of a LTI system is h(n) = u(n+1) – u(n-4). If the input signal is x(n) = u(n) – 2 u(n-2) + u(n – 4), find the response of the system.
(3) (2) (1,2) (08)

b. Compute [cosπt[u(t+1) – u(t-3)]] * u(t)
(3) (2) (1,2) (06)

c. Convolute x(t) = t 0< t < 1 and h(t) = u(t) – u(t - 2).
(2) (2) (1,2) (06)

UNIT - III

4 a. List properties of impulse response representation of LTI systems. Assess i) Causality ii) Memory and iii) Stability of the LTI systems using impulse response.
(2) (3) (4) (06)

b. Ascertain i) Causality, ii) Stability of a LTI system with $h(t) = e^{-4|t|}$
(3) (3) (4) (06)

c. Draw the direct form-I and II implementation of the system represented by differential equation
$$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 4y(t) = \frac{dx(t)}{dt}$$
(3) (3) (4) (08)

c. Realize the direct form I and II of $y(n) + ¼\, y(n-1) + 1/8\, y(n-2) = x(n) + x(n-1)$. (2) (3) (1,2)

OR

5 a. Check for stability, causality and memory of the LTI system impulse responses,
i) $h(n) = n\,(½)^n u(n)$ ii) $h(t) = e^{-t}\,u(t+1)$ (2) (3) (1,2)

b. Find the total response of $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2\,y(t) = 4\,e^{-3t}$
$y(0) = 3$ $y'(0) = 4$ (3) (3) (1,2)

c. Realize direct form I and II for $0.77y'''(t) - 3y'(t) + y(t) = x(t) + 2\,x'(t)$ (2) (3) (1,2)

UNIT – IV

6 a. List properties of ROC with reference to Z-transforms. (2) (4) (1)

b. Determine Z-transforms of following
i) $x(n) = (\frac{1}{2})^n\, u(-n)$ ii) $x(n) = \cos\omega_0 n\, u(n)$. (3) (4) (4)

c. A causal LTI system is described by
$y(n) - y(n) + \frac{5}{6}\,y(n-1) + \frac{1}{6}y(n-2) = x(n)$,
determine i) system function H(z) and ii) impulse response. (3) (4) (5)

UNIT -V

7 a. State and prove time convolution and frequency convolution properties of Fourier transform. (1) (5) (1,2)

b. Find the inverse Fourier transform of
i) $X(j\Omega) = \frac{3 - \frac{1}{4}e^{-j\Omega}}{\frac{1}{16}e^{-2j\Omega}+1}$ ii) $X(j\Omega) = \frac{6}{e^{-2j\Omega} - 5e^{-j\Omega} + 6}$ (3) (5) (1,2)

OR

8 a. State and prove time shifting and time scaling properties of Fourier transform. (1) (5) (1,2)

b. Find the Fourier transform of $f(t) = e^{-at} \cos \omega t$ using the convolution property. (3) (5) (1,2)

c. Find the inverse Fourier transform of $X(j\omega) = \frac{j\omega}{(2+j\omega)^2}$. (2) (5) (1,2)

USN

EC34/16EC34

Third Semester B.E. Semester End Examination, Nov. / Dec. 2017-18

SIGNALS AND SYSTEMS

Time: 3 Hours | Max. Marks: 100

Instructions: 1. *Unit II and Unit V are compulsory.*
2. *Answer any three questions, choosing one question each from units I, III and IV.*

UNIT - I

a. Explain the following: 08 M
i) Discrete time and continuous time signals ii) Deterministic and random signals iii.)Energy and Power signals iv). Causal and non causal signals.
(Level [1], CO[1], PO[1,4])

b. Signals x[n] and y[n] are given by 06 M
x[n] = 3δ[n+3] + 2δ[n+2] + δ[n+1] + δ[n-1] + 2δ[n-2] + 3δ[n-3] and
y[n] = -δ[n+4] -δ[n+3] -δ[n+2] - δ[n+1] + δ[n-1] + δ[n-2] + δ[n-3] + δ[n-4].
Sketch (i)x[3n-1] (ii) x[n]+y[-2-n]
(Level [3], CO[1], PO[1,4])

c. Determine the odd and even parts of the following signals: 06M

i. $x(n) = \{1,\ 1, (0.5)\ ,1\}$. ii. $x(t) = \begin{cases} 1, & -1 \le t < 1, \\ -1, & 1 \le t < 2, \\ 0, & otherwise \end{cases}$

(Level [2], CO[1], PO[1,4])

OR

a. Determine whether the following signals are periodic. If periodic, determine its fundamental time period. 10 M

$i. x(n) = \cos\left(\frac{\sqrt{3}}{4}n\right) + \sin(2\pi n)$ $ii. x(t) = 2e^{-t}sin(t+1)$

(Level [3], CO[1], PO[1,4])

b. Explain the following properties of the system with suitable examples: Memory, Time invariance, Causality, Stability and Linearity. 10 M
(Level [2], CO[1], PO[1,4])

UNIT – II

a. Sketch the output y(n) of an LTI system which is characterized by the equation 08 M
y(n)= x(n+1)+5x(n)-8x(n-1)+5x(n-2), input x(n)= u(n).
(Level[3], CO[2], PO[1,4])

b. Sketch y(t)=x(t)*h(t), given x(t)= u(t+2)-u(t-1) y(t)= u(-t+2) 08 M
(Level [3], CO[2], PO[1,2,4])

c. Draw the interconnection of systems to realize 04 M
$h(t) = h1(t) + \{h2(t) + h3(t)\} * h4(t)$
(Level [3], CO[2],PO [1,4])

UNIT – III

a. Find the total response for 10 M
$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = 4e^{-3t}, t \ge 0;\ y(0) = 3, y'(0) = 4$$
(Level[3], CO[3], PO[1,2,4])

b. Find the natural response of following system, 05 M
$$\frac{5dy(t)}{dt} + 10\,y(t) = 2\,x(t);\quad y(0) = 3$$
(Level[2], CO[3], PO[1,4])

c. The impulse response of a system is h(t)= 2^n u(n-1). Check, whether the system is stable, causal and memoryless. 05 M
(Level [2], CO[3], PO[1,4])

OR

5 a. Find total response of a system defined by equation $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = 2x(t)$
With y(0) = - 1, and $\frac{dy}{dt}$ = 1 at t = 0, and x(t) = cos(t)u(t). (3) (3) (5) (10)

b. Find forced response of the system described by the difference equation
$y(n) + y(n-1) + \frac{1}{2}y(n-2) = x(n) + 2x(n-1)$, with input x(n) = u(n). (3) (3) (5) (10)

UNIT - IV

6 a. Find the Z transform of
i) $x(n) = n(n+1)\,a^n u(n)$
ii) $x(n) = (0.8)^n u(-n-1)$ and mark the ROCs. (3) (4) (1,2) (06)

b. Determine the inverse z transform of
$X(z) = (z+2)/(2z^2 - 7z + 3)$ if ROC |z| > 3 , ROC |z| < ½, ROC ½ < |z| < 3. (3) (4) (1,2) (08)

c. A causal stable system has y(n) = 5/6 y(n-1) – 1/6 y(n-2) + x(n) – 2 x(n-1) determine i) H(z) system function. Ii) Impulse response h(n) (2) (4) (1,2) (06)

UNIT -V

7 a. State and prove following properties of Fourier Transforms
i) Frequency shift, ii) Linearity, iii) Time shift (3) (5) (4) (12)

b. Obtain Fourier Transform of the following
i) $x(t) = \frac{1}{1+jt}$ ii) x(t) = 1, for | t | ≤ T_0
= 0, otherwise (3) (5) (4) (08)

OR

8 a. State and prove Perseval's theorem. (3) (5) (4) (08)

b. Find fourier transform of the following
i) x(n)= α^n u(n) where |α | < 1
ii) x(n) = δ(n)
iii) x(n) = u(n) – u(n – 6). (3) (5) (4) (12)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

USN

16EC34

Third Semester B.E. Makeup Examination, January 2018

SIGNALS AND SYSTEMS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Unit II and Unit V are to be attempted compulsorily.*
2. *Answer any three questions, choosing one question each from units I, III and IV.*

UNIT - I

1 a. Define the following signals with suitable examples: **06 M**
i. Periodic and non-periodic signals ii. Even and odd signals
ii. Deterministic and random signals.
(Level[1],CO[1],PO[1,4])

b. Sketch the signal r (t+3) – r (t). **04 M**
(Level[2],CO[1],PO[1])

c. Define the energy and power of a signal with relevant equations. Determine the energy and power of the signal shown in fig.1c. **10 M**

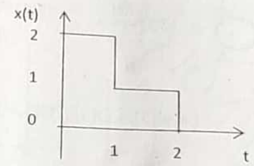

Figure 1c.

Level[2],CO[1],PO[1,4])

OR

2 a. Determine whether the following signals are periodic. If periodic, determine its fundamental time period. **10 M**

$i.\, x(n) = \cos\left(\frac{\sqrt{3}}{4}n\right) + \sin(2\pi n)$ $ii.\, x(t) = 2e^{-t}\sin(t)$

(Level[3],CO[1],PO[1,4])

b. Explain the following properties of the systems with suitable examples: Memory, Time invariance, Causality, Stability and Linearity. **10 M**
(Level[2],CO[1],PO[1,4])

UNIT – II

3 a. Sketch the output y(n) of an LTI system is characterized by the equation y(n)= x(n+1)+5x(n)-8x(n-1)+5x(n-2), input x(n)= u(n). **08 M**
(Level[3], CO[2], PO[1,4])

b. Convolute h_1 (t) and h_2(t) given $h_1(t) = e^{-2t}u(t)$, $h_2(t) = u(t)$. Determine whether h(t) is stable. **08 M**
(Level[3], CO[2], PO[1,4])

c. Draw the block diagram of the system given by y(t)=[u(t+1)+r(t-3)]*x(t). **04 M**
(Level[3], CO[2],PO [1,4])

UNIT – III

4 a. Find the total response for **10 M**

$$\frac{dy(t)}{dt} + 0.5y(t) = x(t), t \geq 0;\; y(0) = 0, x(t) = u(t)$$

(Level[3],CO[3],PO[1,2,4])

OR

5 a. A system is modeled by the linear differential equation $0.77\frac{d^3y(t)}{dt^3} - 3\frac{dy(t)}{dt} + y(t) = x(t) + 2\frac{dx(t)}{dt}$. Draw the block diagram for the system in direct forms I and II. 10
(Level [3], CO[3], PO[1])

b. Determine the overall response of the system shown in fig.5b, given $H_1(n) = (1/3)^n u(n)$ $H_2(n) = (1/2)^n u(n)$ $H_3(n) = (1/5)^n u(n)$ 10

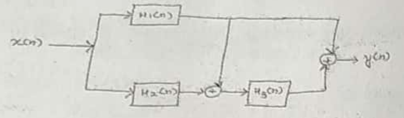

Figure 5b.

(Level [3], CO[3], PO[1,4])

UNIT – IV

6 a. Compute the Fourier transform of the following signals: i)x(t)=e^{-at} cos wt 10
ii) x(t) = t 0 < t <1
(Level [3], CO[4], PO[1,])

b. State and prove the convolution property of FT. 05
(Level [2], CO[4], PO[1,4])

c. Find the DTFT of unit step sequence 05
(Level [2], CO[4], PO[1,4])

OR

7 a. Explain Fourier Transform. State and prove the following properties of Fourier Transform: i) Time shifting ii)Time scaling iii)Time reversal 10
(Level [2],CO[4],PO[1, 4])

b. Find the Fourier Transform of i) x(t) = 1 0 < t < 1 10
=2 1< t < 2
ii) x(n) = n (0.5) ^{n} u(n)
(Level [3], CO[4], PO[1,4])

UNIT –V

8 a. Find the Z-transform of the following functions and indicate the ROC. i) $x(n) = (0.1)^n u(n) + (0.3)^n u(-n-1)$ ii) $x(t) = e^{-at}\sin(\omega t)$ 10
(Level [3], CO[5], PO[1,4])

b. A discrete LTI system is characterized by $H(z) = \frac{z(3z-4)}{\left(z-\frac{1}{2}\right)((z-3))}$. Specify the ROC and determine h(n) if the system is i)causal ii)stable 10
(Level [4], CO[5], PO[1,4])

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USN 2GI

15EC34

Third Semester B.E. Semester End Examination, Nov./ Dec.2016-17

SIGNALS AND SYSTEMS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Unit II and V are compulsory.*
2. *Answer any one full question from remaining each units.*

UNIT - I

1 a. Differentiate between
i) Energy and power signals
ii) ~~Deterministic and non-deterministic signals~~
iii) Symmetric and antisymmetric signals
(Level[4], CO[1], PO[1,9]) 06 M

b. Determine the odd and even parts of the signal $x(t)=4+e^{3t}$.
(Level[L3], CO[1], PO[1,9]) 06 M

c. Determine x(-t-3) and x(3t-1) for the signal shown in fig.1c.

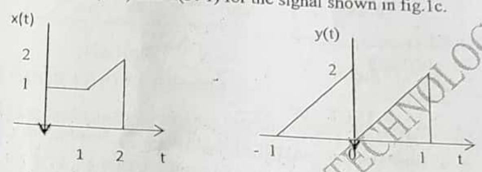

Fig. 1c.

(Level[3], CO[1], PO[1,9]) 08 M

OR

2 a. Given $x_1(t) = \begin{cases} 1;\ 0 < t < 1, \\ 2;\ 1 < t < 2, \\ 1;\ 2 < t < 3 \\ 0;\ otherwise. \end{cases}$ and $x_2(t) = \begin{cases} t;\ 0 < t < 1, \\ 1;\ 1 < t < 2, \\ 3 - t;\ 2 < t < 3 \\ 0;\ otherwise. \end{cases}$

Sketch $x_1(t)$, $x_2(t)$ and $x_1(t)x_2(t)$.
(Level[L3], CO[1], PO[1,9]) 10 M

b. Determine whether the following systems are Memoryless, Time invariant, Causal, Stable and Linear. i) $y(t) = x(-t-2)$ ii) $y(t) = \sqrt{x(t)}$
(Level[4], CO[1], PO[1,9]) 10 M

UNIT – II

3 a. Determine the convolution sum of x[n]= {2,-4,7, 9, 6 } and h[n]={ -4,3,0,3,4 }
(Level[L3], CO[2], PO[1,9]) 05 M

b. Perform the convolution for $x(t) = t^2u(t)$, $h(t) = u(t-1)$. Sketch $y(t) = x(t) * h(t)$.
(Level[3], CO[2], PO[1,9]) 08 M

c. An LTI system is characterized by the impulse response $h(t) = tu(t)$. Determine the system output for the input $x(t) = \sin(t)\,u(t)$.
(Level[3], CO[2], PO[1,9]) 07 M

UNIT - III

4 a. Find the total response for

$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = 4e^{-3t}, \quad t \geq 0;\ y(0) = 3, \quad y'(0) = 4$$

(Level[3], CO[3], PO[1,9]) 10 M

b. Find the natural response of following system,

$$\frac{d^2y(t)}{dt^2} + 2\frac{dy(t)}{dt} + 0.75y(t) = 0, \quad y(0) = 0.25, \quad \left.\frac{dy(t)}{dt}\right|_{t=0} = -1$$

(Level[3], CO[3], PO[1,4]) 05 M

c. The impulse response of a system is h(t)= sin t u(t). Check whether the system is stable, causal and memoryless.
(Level[4], CO[3], PO[1,4]) 05 M

OR

5 a. A system is modeled by the linear differential equation $1.2\frac{dy(t)}{dt} + 2.1y(t) = 0.9x(t) + 0.6\frac{dx(t)}{dt} + 3.1\frac{d^2x(t)}{dt^2}$. Draw the block diagram for the system in direct forms I and II.
(Level[3], CO[3], PO[1,2, 4]) 10 M

b. Determine the overall response of the system shown in fig.5b, given
$h_1(t) = t\,u(t)$, $h_2(t) = u(t)$, $h_3(t) = u(t)$.

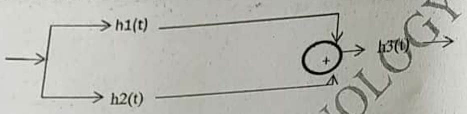

Figure 5b.

(Level[3], CO[3], PO[1,4]) 10 M

UNIT – IV

6 a. Compute the Fourier transform of the following signals:
i) $x(t) = e^{-2t}u(t)$ ii) $x(t) = e^{-a|t|}$ $a > 0$
(Level[3], CO[4], PO[1,4]) 10 M

b. State and prove Parseval's theorem.
(Level[2], CO[4], PO[1,4]) 10 M

OR

7 a. Explain Fourier Transform. State and prove the following properties of Fourier Transform: i) Time shifting ii)Time scaling iii)Time reversal
(Level[2], CO[4], PO[1, 4]) 10 M

b. Find the Fourier Transform of i) impulse function ii) unit step function
(Level[3], CO[4], PO[1,4]) 10 M

UNIT –V

8 a. Find the Z-transform of the following functions using basic equation and indicate the ROC.
i) $x(n) = 3(\frac{4}{5})^n u(n) - \left(\frac{2}{3}\right)^n u(n)$ ii) $x(n) = 3.2^n u(-n)$
(Level[3], CO[5], PO[1,4]) 10 M

b. The transfer function of a system is given by $H(z) = \frac{1}{1-0.5z^{-1}} + \frac{1}{1-2z^{-1}}$
Determine the stability and causality of the system for
i) ROC: $|z| > 2$; ii) ROC: $|z| < 0.5$.
(Level[3], CO[5], PO[1,4]) 10 M

b. A system is modeled by the linear differential equation $0.77\frac{d^3y(t)}{dt^3} - 3\frac{dy(t)}{dt} + y(t) = x(t) + 2\frac{dx(t)}{dt}$. Draw the block diagram for the system in direct forms I and II. 10

(Level[3], CO[3], PO[1,9])

OR

5 a. The impulse response of a system is h(t)=e^{-4t} u(t-2). Check whether the system is stable, causal and memoryless. 05

(Level[4], CO[3], PO[1,9])

b. Find the natural response of following system. 05

$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = 4e^{-3t}, t \geq 0;\ y(0) = 3, y'(0) = 4$$

(Level[3], CO[3], PO[1,9])

c. Determine the overall response of the system shown in fig.5c, given 10

$$h_1(t) = e^{-6t}u(t),\ h_2(t) = e^{2t}u(t),\ h_3(t) = tu(t).$$

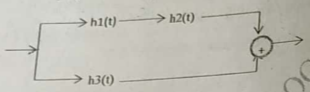

Fig. 5c.

(Level[3], CO[3], PO[1,9])

UNIT - IV

6 a. Define Fourier Transform. State and prove the following properties of Fourier Transform: i) Time shifting ii)Time scaling iii)Time reversal 10

(Level[2], CO[4], PO[1,9])

b. Determine the Fourier Transform of the rectangular pulse defined as 10

$x(t) = \begin{cases} 1, & |t| < a \\ 0, & |t| > a \end{cases}$ Plot the magnitude and phase spectrum.

(Level[3], CO[4], PO[1,9])

OR

7 a. Define Fourier Transform. Find the Fourier Transform of the following signals: 10

i) unit impulse ii) decaying exponential iii)The rect function.

(Level[2,3], CO[4], PO[1,9])

b. State and prove Parseval's theorem. Compute the energy of the signal 10

$$x(t) = e^{-at}u(t).$$

(Level[2,3],CO[4],PO[1,9])

UNIT -V

8 a. Find the Z-transform of the following functions and indicate the ROC. 10

i) $x(n) = (0.1)^n u(n) + (0.3)^n u(-n-1)$

ii) $x(t) = e^{-at}\sin(\omega t)$

(Level[3], CO[5], PO[1,9])

b. A discrete LTI system is characterized by $H(z) = \frac{z(3z-4)}{\left(z-\frac{1}{2}\right)((z-3))}$. Specify the ROC and determine h(n) if the system is i) causal ii) stable 10

(Level[3], CO[5], PO[1,9])

Library - 21/12/18 - 09.30 to 12.50

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16EC35

Third Semester B.E. Semester End Examination, DEC/JAN 2018-19

NETWORK ANALYSIS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Units I and III are compulsory*
2. *Answer one question each from the remaining units*
3. *Assume suitable data if necessary*

UNIT – I

L CO PO M

1 a. Calculate the resistance between a and b terminals of the network shown in Fig.1(a)

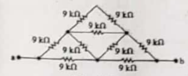

Fig.1(a)

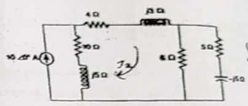

Fig. 1(b)

(3) (1) (1) (06)

b. Using mesh analysis find the current flowing through (4+3j)Ω and power dissipated in 5Ω resistor for the network given in Fig.1(b).

(3) (1) (1) (07)

c. Determine the node voltages V_1, V_2 and V_3 for the circuit shown in Fig.1(c) by applying Node analysis.

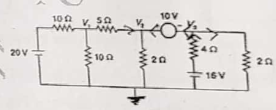

Fig. 1(c)

(3) (1) (1) (07)

UNIT – II

L CO PO M

2 a. Using Millman's theorem, find the current through the load resistance R_L=10Ω in the circuit shown in Fig. 2(a)

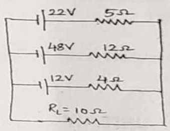

Fig. 2(a)

(2) (2) (1,2) (06)

b. In the circuit shown in Fig. 2(b), find the value of R that receives maximum power and calculate the maximum power.

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

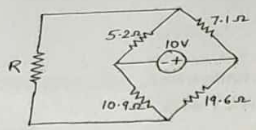

Fig. 2(b)

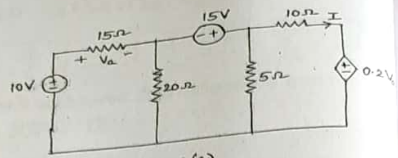

Fig. 2(c)

(3) (2) (1,2)

c. Using superposition theorem, find the current in 10Ω resistance for the circuit shown in Fig. 2(c)

(3) (2) (1,2)

OR

3 a. Obtain Norton's equivalent circuit for the network shown in Fig. 3(a)

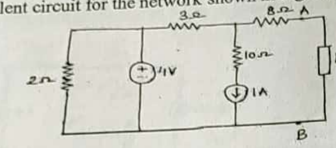

Fig. 3(a)

(2) (2) (1,2)

b. Verify Reciprocity theorem by finding current I in the circuit shown in Fig. 3(b)

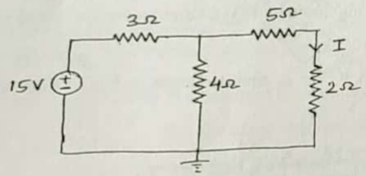

Fig 3(b)

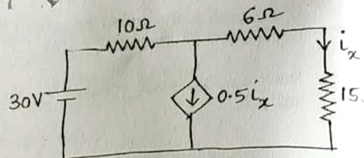

Fig 3(c)

(3) (2) (1,2)

c. Find the current flowing through 15Ω in the circuit of Fig. 3(c) using Thevenin's theorem

(3) (2) (1,2)

L CO PO

UNIT – III

4 a. What is resonance? Derive an expression for resonant frequency of a series RLC circuit.

(2) (3) (1)

b. An inductive coil of resistance 6Ω and inductance 1mH is connected in parallel with an… branch consisting of a resistance of 4Ω in series with a capacitance of 20μF. Find the reso… frequency and the corresponding current when applied voltage is 200V. When voltage is red… to 100V, what is the current?

(2) (3) (1,2)

c. Show that in RLC series resonant circuit $f_r=\sqrt{f_1 f_2}$, where f_1 and f_2 are lower and upper cu… frequencies.

(2) (3) (1)

L CO PO

UNIT – IV

5 a. Derive an expression for the voltage developed across the capacitor during transient period … R-C circuit with DC excitation. Also sketch the voltage waveform.

(2) (4) (1)

b. In the circuit shown in Fig. 5(b), switch K is changed from a to b at t=0, steady state condition having been reached before switching. Find the values of i, di/dt and d^2i/dt^2 at $t=0^+$.

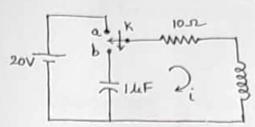

Fig. 5(b)

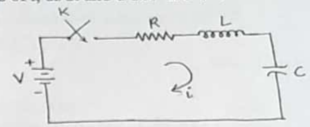

Fig. 6(b)

(3) (4) (1,2) (10)

OR

a. What are transients in electrical systems? Explain the behavior of circuit elements R, L and C under transients. i.e., at t=0- and t=0+.

(2) (4) (1) (10)

b. In the circuit shown in Fig. 6(b), V=20V, R=10Ω, L=0.5H, C=10μF and $v_c(0)=0$, find $i(0^+)$, $di/dt(0^+)$, $d^2i/dt^2(0^+)$

(3) (4) (1,2) (10)

L CO PO M

UNIT -V

a. Calculate Y parameters for the network given in Fig. 7 (a).

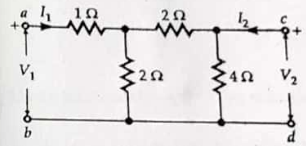

Fig. 7 (a)

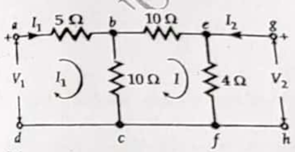

Fig.8 (a)

(3) (5) (1) (08)

b. Explain the conditions for symmetry and reciprocity of Z parameters.

(2) (5) (1) (08)

c. Define the following terms i) Graph ii) Co-tree iii) Tie-set iv) Fundamental Cut set.

(1) (5) (1) (04)

OR

a. Calculate Z parameters for the network given in Fig. 8(a). Using them calculate Y parameters.

(3) (5) (1) (10)

b. Derive expressions for Y parameters in terms of Z parameters.

(2) (5) (1) (10)

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16EC35

Third Semester B.E. Makeup Examination, January 2019

NETWORK ANALYSIS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. Unit I and III are COMPULSORY
2. Answer ANY ONE Question from Unit II, IV and V

UNIT - I

L CO PO M

1 a. Calculate equivalent resistance between terminals A and B using star-delta transformation technique for the circuit shown in Fig. 1(a)

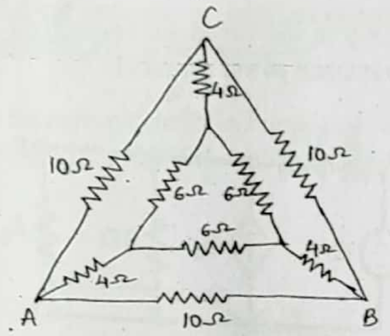


Fig. 1(a)

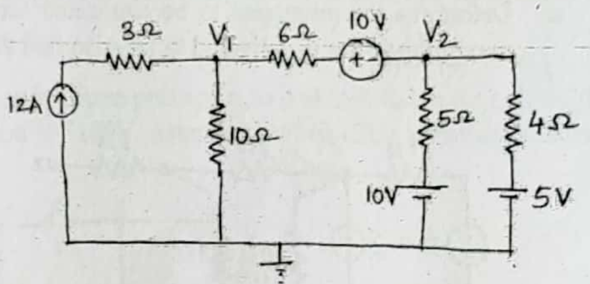


Fig. 1(b)

(2) (1) (1,2) (06)

b. Using mesh analysis, find the voltages V_1 and V_2 of the circuit shown in Fig. 1(b)

(3) (1) (1,2) (06)

c. Using node voltage analysis, calculate voltages V_1 and V_2 of the circuit shown in Fig. 1(c)

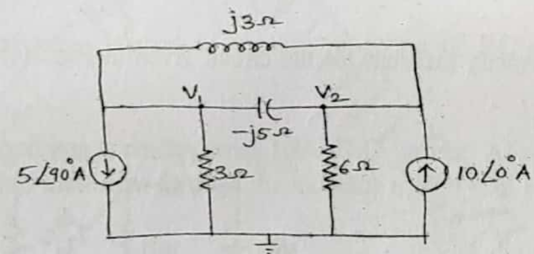


Fig 1(c)

(3) (1) (1,2) (08)

UNIT – II

L CO PO M

2 a. Apply Superposition theorem to find the current i for the circuit shown in Fig. 2(a)

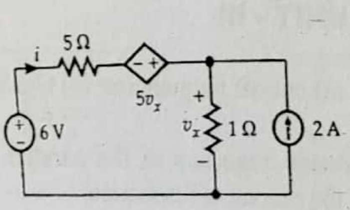


Fig. 2(a)

(3) (2) (1) (07)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Apply Thevenin's theorem to find the power loss in 1Ω resistor connected across x-y termin... the circuit shown in Fig.2(b).

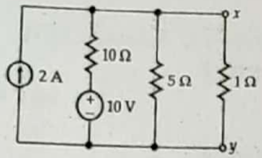


Fig.2 (b)

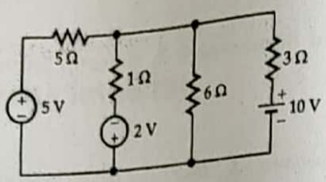


Fig. 2 (c)

(3) (2) (12)

c. Using Millman's theorem, find the current through 6Ω resistor for the network shown in Fig 2...

(3) (2) (12)

OR

3 a. Determine the resistance to be connected across x-y in the circuit shown in Fig.3 (a) suc... maximum power is delivered to it? Also find the maximum power delivered.

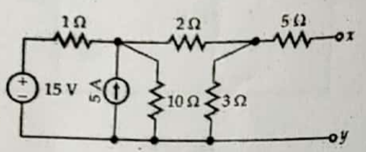


Fig. 3(a)

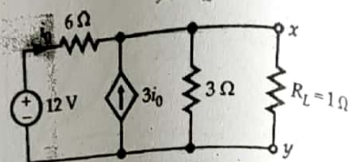


Fig. 3(b)

(1) (2) (12)

b. Apply Norton's theorem to find the current through R_L in the circuit given in Fig. 3(b)

(3) (2) (1)

c. Verify Reciprocity theorem for the circuit given in Fig. 3(c) by determining the current th... 20Ω resistor.

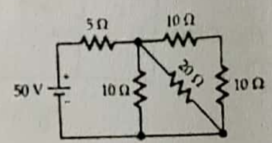


Fig.3(c)

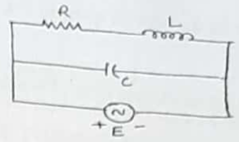
(3) (02) (1)
L CO PO

UNIT - III

4 a. Define the following terms :
i) Resonance ii) Bandwidth iii) cut-off frequencies iv) Quality factor

(1) (3) (1)

b. Derive the expression for resonant frequency of the parallel resonant circuit shown in Fi... Also derive the expression for the current at resonance.



Fg. 4(b)

c. A series RLC circuit has a resistance of 15Ω, an inductance of 0.5H and a capacitance of 200μF. The applied voltage is 230V. Find i) resonant frequency ii) quality factor iii) lower and upper cut-off frequencies iv) bandwidth v) current at resonance vi) current at cut-off frequencies vii) voltage across inductance at resonance. (2) (3) (1) (08)

UNIT - IV

(3) (3) (1,2) (08)
L CO PO M

a. What are transients in electrical systems? Explain the behavior of circuit elements R, L and C under transients. i.e., at t=0- and t=0+.

(2) (4) (1) (10)

b. In the network shown in Fig. 6(a), K is changed from position a to b at t=0. Solve for i, di/dt, d^2i/dt^2 at t=0+, if R =1,000Ω, L=1H, C= 0.1μF and V= 100V. Assume that capacitor is initially uncharged.

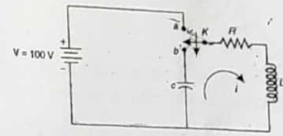


Fig. 5(b)

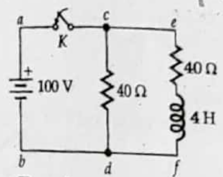


Fig. 6(b)

(3) (4) (1) (10)

OR

a. Explain the importance of time constant in transient analysis of RC series circuit with D.C. excitation.

(2) (4) (1) (10)

b. In Fig.6 (b) steady state condition is reached with 100V D.C. source. At t=0, switch K is suddenly opened. Find the expression of current through the inductor after t=1/2 sec, t= 1sec. Analyse the results.

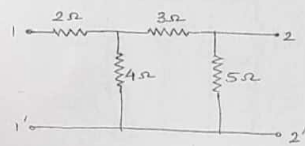
(4) (4) (1) (10)
L CO PO M

UNIT –V

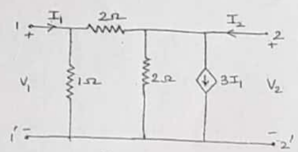
a. Define the following terms with respect to network topology.
i) Tree ii) Oriented graph iii) Cut-set iv) Incidence matrix

(1) (5) (1) (04)

b. Calculate z-parameters for the network given in Fig. 7(b)



Fg 7(b)



Fg 8.(a)

(3) (5) (1,2) (08)

c. Explain the conditions of symmetry and reciprocity of y-parameters .

(2) (5) (1) (08)

OR

8 a. Calculate y-parameters for the network given in Fig. 8 (a). Also draw the y-parameter equ[illegible] network. (3) (5) (1,2)

b. Derive expressions for z-parameters in terms of y-parameters. (2) (5) (1)

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Third Semester B.E. Semester End Examination, Dec/Jan 2017-18 **16EC35**

Time: 3 Hours

NETWORK ANALYSIS

Max. Marks: 100

Instructions: 1. *Units I and II are COMPULSORY.*
2. *Assume suitable data.*

UNIT - I

1 a. Using source shifting and transformation find the voltage Vx in the circuit shown in Fig.(1a). 08 M

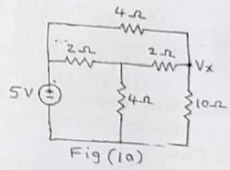


Fig (1a)

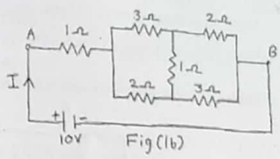


Fig (1b)

(Level [3], CO [1], PO [1])

b. Find the current I in the circuit given in Fig.(1b) by reducing the resistive network between terminals A-B into a single resistor. 06 M

(Level [3], CO [1], PO [1,2])

c. Using mesh analysis evaluate all the mesh currents for the circuit shown in Fig.(1c). 06 M

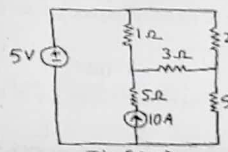


Fig (1C)

(Level [2], CO [1], PO [1])

UNIT -II

2 a. Find the current through (2+4j)Ω in the circuit given in Fig. 2 (a) using Millman's theorem. 06 M

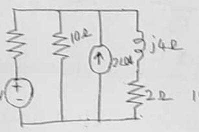


Fig. 2(a)

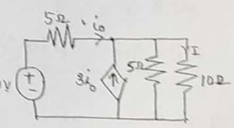


Fig. 2(b)

(Level [3], CO [2], PO [1])

b. Solve and draw the Thevenin's equivalent circuit of the network given in Fig. 2(b) and also calculate the current I through the 10Ω resistor. 08 M

(Level [3]], CO [2], PO [1,2])

c. Apply the maximum power transfer theorem to calculate the load Z_L and maximum power dissipated in the load.

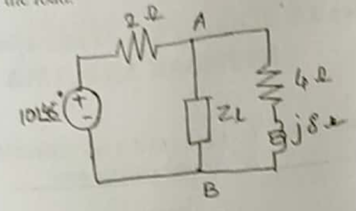


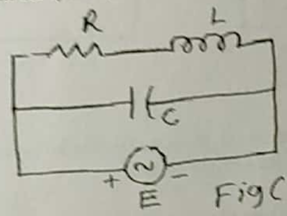
Fig. 2(c)

(Level [3], CO [2], PO [1, 2])

UNIT -III

3 a. Define : i) Resonance ii) Bandwidth iii) Cut-off frequencies iv) Quality factor.
(Level [1], CO [3], PO [1])

b. Derive the expressions for f_0 and I_0 for the parallel resonant circuit shown in Fig.(3b).



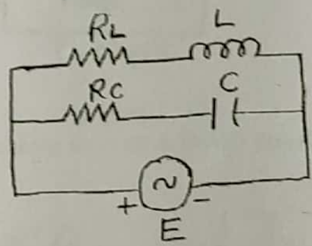
Fig(3b)

(Level [2], CO [3], PO [1])

c. Derive the expressions for the cut-off frequencies f_1 and f_2 in terms of the frequency deviation (δ).
(Level [2], CO [3], PO [1])

OR

4 a. Derive an expression for the resonant frequency f_0 for the parallel resonant circuit shown in Fig.(4a).



Fig(4a)

(Level [2], CO [3], PO [1])

b. An inductive coil of inductance 10mH and a series resistance of 10Ω is connected in parallel with the other branch consisting of a capacitor of 100μF and a series resistance of 100Ω with it. Find the resonant frequency and the corresponding current when the applied voltage is 50V.
(Level [3], CO [3], PO [2])

UNIT -IV

5 a. Find the current at t > 0 if alternating voltage v is applied when the switch K is moved from 1 to 2 at t = 0 in Fig.5 (a). Assume a steady state current of 1A in L R circuit when the switch was at position 1. 10 M

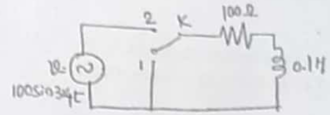


Fig 5(a)

(Level [3], CO [3], PO [1,2])

b. How is time constant of an RC circuit defined? Explain its importance in transient analysis with a suitable example 10 M
(Level [2], CO [3], PO [1])

OR

a. How is time constant of an RL circuit defined? Explain its importance in transient analysis with a suitable example. 10 M
(Level [2], CO [3], PO [1])

b. In the circuit shown in Fig. 6 (b) the switch is changed from position 1 to 2 at t = 0. The steady state having been reached before switcing. Determine the values of i, di/dt and d^2i/dt^2 at t = 0. 10 M

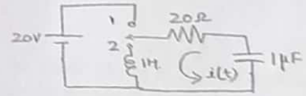


Fig 6 (b)

(Level [3], CO [3], PO [1,2,12])

UNIT -V

a. Determine Y parameters of the network given Fig.7 (a). Also draw Y parameter equivalent network. 10 M

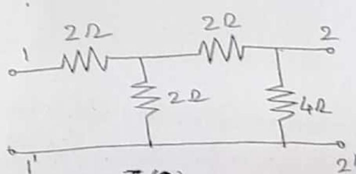


Fig 7(a)

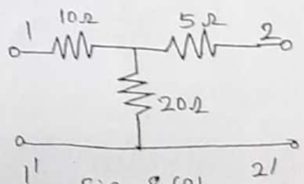


Fig. 8 (a)

(Level [3], CO [5], PO [1,2])

b. Explain the conditions for symmetry and reciprocity of Z parameters. 10 M
(Level [2], CO [5], PO [1, 12])

OR

a. Determine Z parameter for the network given in Fig. 8 (a). Also draw Z parameter equivalent network 10 M
(Level [3], CO [5], PO [1,2])

b. Explain the conditions for symmetry and reciprocity of Y parameters. 10 M
(Level [2], CO [5], PO [1, 12])

USN

16EC35

Third Semester B.E. Makeup Examination January 2018

NETWORK ANALYSIS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. Unit I and II are compulsory
2. Answer any one question from Unit III, IV to V

UNIT - I

1 a Calculate the current flowing through 3Ω resistor of the circuit given in Fig. 1(a) using mesh analysis method. **10 M**

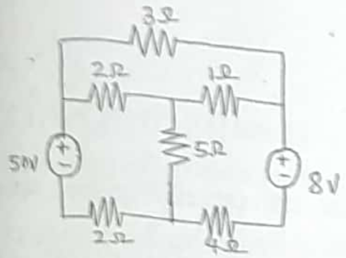
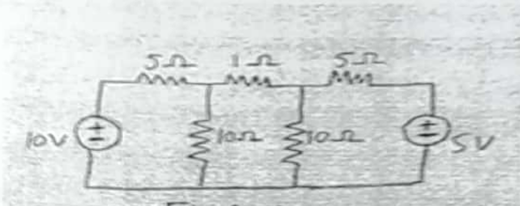


Fig. 1(a)



Fig(1b)

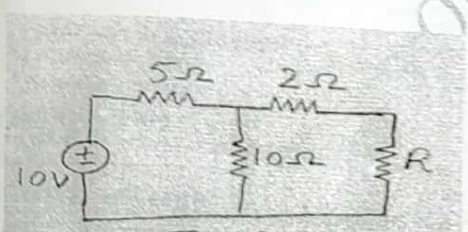
(Level [3], CO [1], PO [1])

b. Determine the value of current through 1Ω in the circuit given in Fig. 1(b) using node analysis method. **10 M**

(Level [3], CO [1], PO [1])

UNIT – II

2 a. Find the value of R in the circuit shown in Fig.(2a) such that maximum power transfer takes place. Also, calculate the amount of maximum power. **08 M**



Fig(2a)

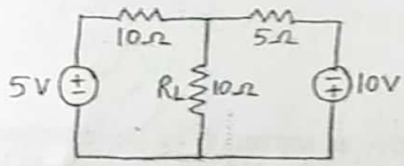


Fig (2b)

(Level [3], CO [2], PO [1, 2])

b. Using Millman's theorem find the current through R_L=10Ω for the circuit shown in Fig.(2b). **08 M**

(Level [3], CO [2], PO [1, 2])

c. State: i) Superposition theorem ii) Reciprocity theorem **04 M**

(Level [1], CO [2], PO [1])

UNIT – III

3 a. A series RLC circuit has a resistance of 1KΩ, an inductance of 10mH in series with capacitance of 1nF. If 50V is applied as input across the combination, determine **10 M**

i) The resonant frequency
ii) The current at resonance
iii) The half power frequencies
iv) The bandwidth

(Level [L3], CO [3], PO [1])

b. In a series resonant circuit, prove that resonant frequency $f_o = \sqrt{(f_1 f_2)}$ where f_1 and f_2 are half power frequencies. **10 M**

(Level [2], CO [3], PO [1,2,12])

OR

4 a. A coil of inductance 10H and 10Ω resistance is connected in parallel with 100pF capacitor. The combination is applied with a voltage of 100V. Determine 10 M

i) Resonant frequency
ii) Impedance at resonance
iii) Current at resonance
iv) Absolute bandwidth

(Level [3], CO [3], PO [1,2,12])

b. Define the terms with appropriate formula for a series resonant circuit. 10 M

i) Resonance
ii) Half - power frequencies
iii) Bandwidth
iv) Q-factor
v) Selectivity

(Level [1], CO [3], PO [1,2,12])

UNIT – IV

5 a. Analyze the transient behavior of resistor, inductor and capacitor under switching condition with proper justification for your explanation. 10 M

(Level [4], CO [4], PO [1])

b. In the network shown in Fig.(5b), K is changed from position a to b at t = 0. Solve for i, di/dt and d^2i/dt^2 at $t = 0^+$ if R – 1KΩ, L = 100mH, C = 0.1μF and V – 100V. Assume that the capacitor is initially uncharged. 10 M

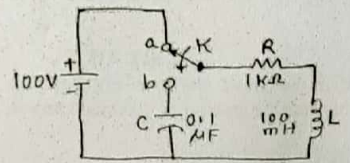


Fig.(5b)

(Level [3], CO [4], PO [2])

OR

6 a. Derive an expression for the instantaneous value of the current i for a DC excited series RL circuit. Draw the rough graph of i Vs t showing the variation of i with respect to t and mark the time-constant on it. Also write an expression for the time-constant.

(Level [2], CO [4], PO [1])

b. In the circuit shown in Fig.(6b), the capacitor is initially uncharged. Switch K is closed at t = 0. The initial value of the current is 25mA. The transient disappears (reduces to 2% of its initial value) after a time of 0.1 sec. By the classical method determine the (i) value of R (ii) value of C (iii) an expression for the current i(t) for t > 0.

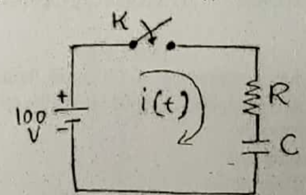


Fig (6b)

(Level [3], CO [4], PO [2])

UNIT -V

7 a. Derive the expressions for Y parameters in terms of Z parameters. 10 M

(Level [2], CO [5], PO [1])

b. Analyze the circuit shown in Fig.(7b) and evaluate Y parameters. 10 M

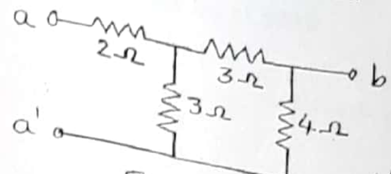


Fig (7b)

(Level [4], CO [5], PO [2])

OR

8 a. Derive the expressions for Z parameters in terms of Y parameters. 10 M

(Level [2], CO [5], PO [1])

b. Analyze the circuit shown in Fig.(8b) and evaluate Z parameters. 10 M

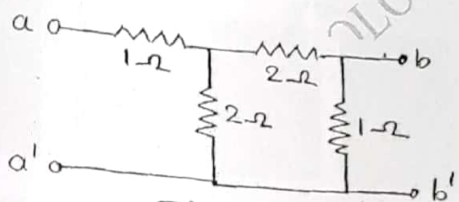


Fig (8b)

(Level [4], CO [5], PO [2])

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Third Semester B.E. Semester End Examination, Nov. / Dec. 2016-17

NETWORK ANALYSIS

Time: 3 Hours Max. Marks: 100

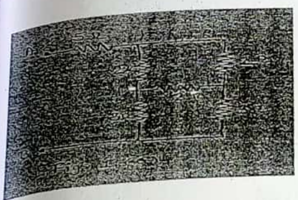
Instructions: *1. Answer FIVE Full questions selecting at least One Question from each Unit.*
2. UNIT-III and V are compulsory.

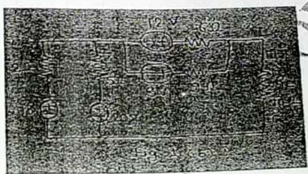
UNIT – I

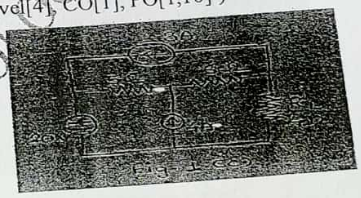
1 a. Using star-delta transformation find equivalent resistance between terminals AB in the network shown in Fig. 1 (a). 06 M
(Level[3], CO[1], PO[2,11])

b. Using source transformation to find the current through load resistance R_L for the network shown in Fig. 1 (b). 07 M
(Level[1], CO[1], PO[1,2])

c. Using mesh analysis find the power delivered to the load resistance $R_L=4\Omega$ as shown in Fig. 1 (c). 07 M
(Level[4], CO[1], PO[1,10])





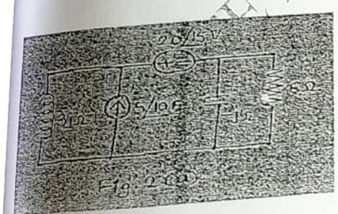


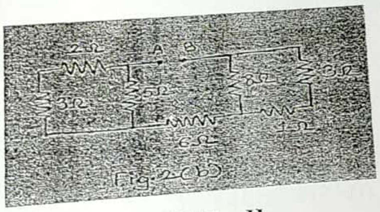
OR

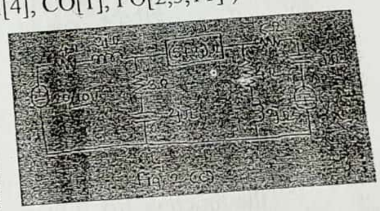
2 a. Using super-nodal analysis technique determine amount of current through 6Ω resistor for the network shown in Fig. 2(a). 08 M
(Level[3], CO[1], PO[2,3])

b. Find the equivalent resistance between the terminals AB for the network as shown in Fig. 2 (b). 05 M
(Level[1], CO[1], PO[1,2])

c. Using node voltage method find V_x for the circuit shown in Fig. 2(c) , if the current through the $(5+3j)\Omega$ is zero 07 M
(Level[4], CO[1], PO[2,3,11])





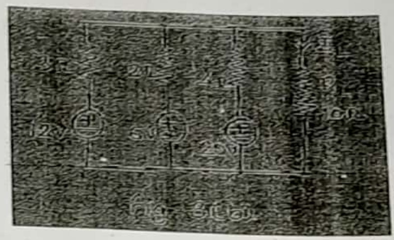


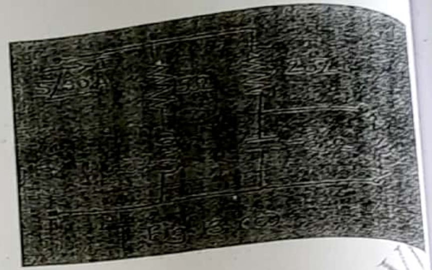
UNIT – II

3 a. State and explain Superposition theorem. 04 M
(Level[3], CO[2], PO[1,2])

b. Using Millman's theorem, find I_L through load resistance R_L for the network shown in Fig. 3 (b). 08 M
(Level[4], CO[2], PO[2,12])

c. Find V_x and hence verify reciprocity theorem for the network shown in Fig. 3(c). 08 M
(Level[4], CO[2], PO[2,3])





OR

4 a. State and explain Thevenin's theorem. 04 M

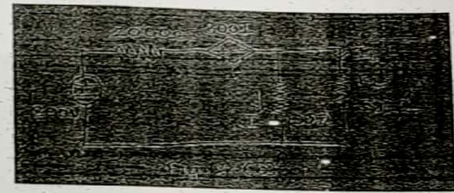
(Level[3], CO[2], PO[1,2])

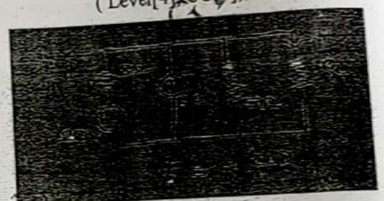
b. Obtain the Norton's equivalent circuit across the load terminals for the network shown in Fig. 4(b) below. 08 M

(Level[4], CO[2], PO[2,3])

c. Find the value of load resistance when maximum power is transferred across it and also find the maximum power for the network shown in Fig. 4(c) above. 08 M

(Level[4], CO[2], PO [2,11])





UNIT – III

5 a. Derive an expression for resonant frequency for RLC parallel circuit. 06 M

(Level[1,4], CO[3], PO[2,3])

b. Derive an expression for Q-factor of RL series circuit. 06 M

(Level[3], CO[3], PO[1,2])

c. A series RLC circuit has R=4Ω, L=1mH & C= 10μF, calculate Q-factor, resonant frequency, maximum value of voltage across inductor and capacitor. 08 M

(Level[4,6], CO[3], PO[2,10])

UNIT – IV

6 a. Define Laplace Transform, find the Laplace Transform of an exponential function 10 M

i. $f(t)= e^{at}$ for $t \geq 0$

ii. $f(t)= e^{-at} \cos \omega t$

iii. $f(t)= e^{-at} \sin \omega t$

iv. $f(t)= 5(t-4)u(t-4)$

v. $f(t)= 10[u(t)+u(t-2)+u(t-4)+\ldots]$

(Level[2,4], CO[4], PO[1,3])

b. State Initial value and Final Value Theorem. Find Initial value and Final Values of the function f(t) if $F(s)=12(s+4)/s^2(s+3)(s+5)$ 10 M

(Level[2,5], CO[4], PO[2,11])

OR

7 a. Obtain the Laplace Transform of standard functions 10 M

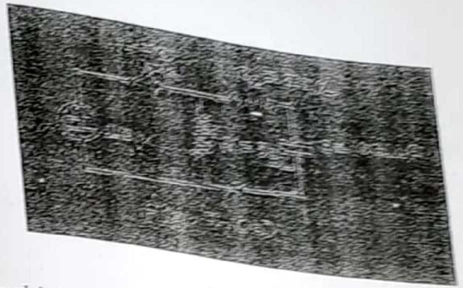
i. Step Function.

ii. Ramp Function.

(Level[5],CO[4],PO[2,3,10])

b. The network shown in Fig. 7(b) the switch K is opened at t=0. Find the expression for voltage across C for t > 0. Also find voltage at t = 0.036 sec. 10 M

(Level[5], CO[4], PO[3,12])



UNIT – V

8 a. State and explain hybrid parameters. 06 M

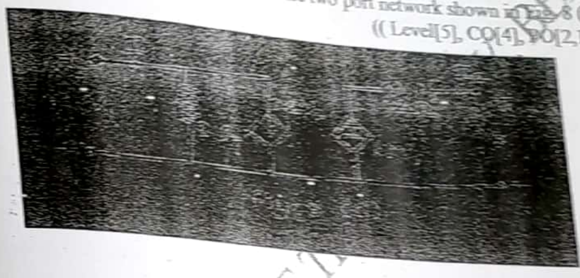
(Level[2], CO[4], PO[3,11])

b. Derive Y-parameters of a circuit in terms of Z-parameters. 06 M

(Level[4], CO[4], PO[2,3])

c. Using the definition, find Y-parameters of the two port network shown in Fig. 8 (c). 08 M

((Level[5], CO[4], PO[2,10])



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Third Semester B.E. Semester End Examination, Dec/Jan 2018-19

STATISTICAL-NUMERICAL-FOURIER TECHNIQUES / ENGINEERING MATHEMATICS - III

Time: 3 Hours Max. Marks: 100

Instructions: 1. *Units III and V are compulsory.*
2. *Answer any one full question from remaining units.*

UNIT - I

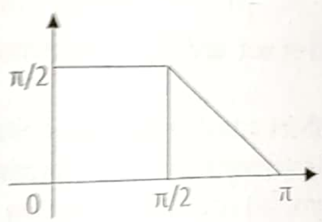
		L	CO	PO	M
1 a.	Compute the real root of the equation $x\log_{10} x - 1.2 = 0$ by the method of false position. Carry out three iterations.	(2)	(1)	(1)	(07)
b.	Using Runge-Kutta method of fourth order, find $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y(0)=1$ taking $h=0.2$.	(1)	(1)	(1)	(07)
c.	Find a real root of the equation $x^3 + x + 1 = 0$ by fixed point iteration method.	(1)	(1)	(1)	(06)

OR

		L	CO	PO	M
2 a.	Find a real root of the equation $xe^x - \cos x = 0$ applying Newton-Raphson's method correct to four decimal places.	(1)	(1)	(1)	(07)
b.	Use modified Euler's method to solve $\frac{dy}{dx} = x + \lvert y \rvert$ in the range $0 \le x \le 0.4$ by taking $h = 0.2$ given that $y(0)=1$ initially.	(2)	(1)	(1)	(07)
c.	Employ Taylor's series method to find y at $x = 0.1$ and 0.2 correct to three places of decimal in step size of 0.1 for the linear differential equation $\frac{dy}{dx} - 2y = 3e^x$ with $y(0)=0$.	(1)	(1)	(1)	(06)

UNIT – II

		L	CO	PO	M
3 a.	Obtain Fourier expansion of $f(x) = \begin{cases} -\pi & -\pi < x < 0 \\ x & 0 < x < \pi \end{cases}$. Hence deduce that $\sum \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$	(2)	(2)	(1)	(07)
b.	Find the Fourier cosine series of the function which is expressed graphically as follows	(2)	(2)	(1)	(07)



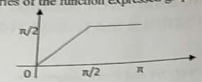
c. Obtain the Fourier series up to second harmonics to the following data. (1) (2) (1) (06)

x:	0	1	2	3	4	5
y:	4	8	15	7	6	2

OR

4 a. Draw the graph of the function $f(x)=\begin{cases}\pi x & 0\le x\le 1\\ \pi(2-x) & 1\le x\le 2\end{cases}$ also find the Fourier expansion of $f(x)$ (2) (2) (1)

b. Find half range sine series of the function expressed graphically



(2) (2) (1)

c. Obtain the constant term and first three coefficients in the fourier cosine series of y using following table

x:	0	1	2	3	4	5
y:	4	8	15	7	6	2

(1) (2) (1)

L CO PO

UNIT - III

5 a. Find the Fourier transform of $f(x)=\begin{cases}1-|x| & in\ |x|<1\\ 0 & otherwise\end{cases}$. Hence evaluate $\int_0^{\infty}\frac{\sin^2 x}{x^2}dx$. (2) (3) (1)

b. Find Fourier sine transform of $e^{-|x|}$. Hence evaluate $\int_0^{\infty}\frac{x\sin mx}{1+x^2}dx$. (1) (3) (1)

c. Find $f(x)$ given that $F_c\{f(x)\}=\frac{1}{1+s^2}$. (2) (3) (1)

L CO PO

UNIT – IV

6 a. A random variable X has following probability function for various values of x

x:	0	1	2	3	4	5	6	7
y:	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Find k (ii) Evaluate $p(x<6)$, $p(x\ge 6)$ and $p(3<x\le 6)$. Also find mean. (1) (4) (1)

b. Derive mean and standard deviation of binomial distribution. (2) (4) (1)

c. The marks of 1000 students in an examination follow normal distribution with mean standard deviation 5. Find the number of students whose marks will be (i) less than 65 (ii) than 75 (iii) between 65 and 75. (2) (4) (1)

OR

7 a. Verify whether the function $p(x)=\begin{cases}6x(1-x) & ,0\le x\le 1\\ 0 & ,otherwise\end{cases}$

(i) is a probability density function or not and (ii) Also determine mean and standard deviat (1) (4) (1)

b. While forming 36-digit binary numbers a malfunctioning digital computer is found to form incorrectly about 1 times in 1000. Assuming the errors in forming different digits to be indepe find the probability of having (i) zero, (ii) one, (iii) more than one and (iv) less than five in digits in a given 36-digit number. (2) (4) (1)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

c. Obtain the equation of the normal probability curve that may be fitted to the following data:

Variable (x)	:	6	7	8	9	10	11	12
Frequency (f)	:	3	6	9	13	8	5	4

(4) (4) (1) (06)

L CO PO M

UNIT-V

8 a. A joint probability distribution is given by the following table

X \ Y	−8	2	4
1	0.1	0.2	0.2
3	0.3	0.1	0.1

Find the marginal distribution of X and Y and Cov(X, Y). Are they independent? (2) (5) (1) (07)

b. Assume that a computer system is in one of three states: busy, idle or undergoing repair denoted by states 0, 1, 2 respectively. It is found that the system approximately behaves like a Markov chain with the transition probability matrix $P=\begin{bmatrix}0.6 & 0.2 & 0.2\\ 0.1 & 0.8 & 0.1\\ 0.6 & 0.0 & 0.4\end{bmatrix}$. Prove that the chain is irreducible, and determine the steady state probability vector. (2) (5) (1) (07)

c. Define i) State classification of Markov chain. (ii) covariance and correlation of X and Y. (1) (5) (1) (06)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

Third Semester B.E. Semester End Examination, Dec/Jan 2017-18

STATISTICAL-NUMERICAL-FOURIER TECHNIQUES / ENGINEERING MATHEMATICS-III)

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *UNIT III and V are compulsory.*
2. *Answer any one question from remaining each unit.*

UNIT - I

1 a. Use Regula falsi method to extract the root of the equation $2x - \log_{10} x = 7$ upto 3 decimals. 06 M

(Level [2], CO [1], PO [1])

b. Apply Newton-Raphson's method to obtain the non-zero root of the equation $f(x) = xe^x - \cos x = 0$ upto 3 decimals. 07 M

(Level [2], CO [1], PO [2])

c. Illustrate fixed point iteration method to find the root of the equation $x = \frac{1}{2} + \sin x$ upto 3 decimals. 07 M

(Level [2], CO [1], PO [1])

OR

2 a. Use Taylor's series method up to 5th derivative term to obtain y (0.3) for the differential equation $\frac{dy}{dx} = x + y^2$, $y(0) = 1$. 06 M

(Level [2], CO [1], PO [2])

b. Apply Euler's modified method to solve the differential equation $\frac{dy}{dx} = x^2 - y^2, y(0) = 1$ at $x = 0.4$ in 2 steps. 07 M

(Level [3], CO [1], PO [1])

c. Illustrate Runge-Kutta's fourth order method to solve $\frac{dy}{dx} = e^x + y$, $y(0) = 0$ at $x = 0.1$ in 1 step. 07 M

(Level [2], CO [1], PO [1])

UNIT – II

3 a. Construct Fourier series for the function $f(x) = 2\pi x$, $0 \le x \le 2$ 06 M

(Level [3], CO [2], PO [1])

b. Transform the function $f(x) = \begin{cases} x^2, & 0 < x < \frac{\pi}{2} \\ x, & \frac{\pi}{2} < x < \pi \end{cases}$ into half-range sine series. 07 M

(Level [2], CO [2], PO [2])

c. Represent the following function in Fourier series up to first harmonic. 07 M

t sec	0	T/6	T/3	T/2	2T/3	5T/6	T
A amp	1.98	1.3	1.05	1.3	–0.88	–0.25	1.98

(Level [2], CO [2], PO [1])

OR

4 a. Construct Fourier series for the function $f(t) = 1 - t^2$, $-1 \le t \le 1$. 06 M

(Level [3], CO [2], PO [2])

b. Transform the function $f(x) = x \cos x$, $0 \le x \le 2$ into half- range Fourier cosine series. 07 M

(Level [2], CO [2], PO [1])

c. Represent the following function in Fourier cosine series up to second term. 07 M

x	0	1	2	3	4	5
y	2	8	12	10	9	6

(Level [2], CO [2], PO [2])

UNIT – III

5 a. Evaluate Fourier Transform of the function $f(t) = a^2 - t^2$, $-a \le t \le a$. Hence deduce the 06 M

value of $\int_0^\infty \frac{t\cos t - \sin t}{t^3}\, dt$ 07 M

(Level [2], CO [3 , PO [2])

b. Solve the integral equation $\int_0^\infty f(x)\sin(tx)\, dx = \begin{cases} 1, & 0 \le t \le 1 \\ 2, & 1 \le t \le 2 \\ 0, & t \ge 2. \end{cases}$ 07 M

(Level [2], CO [3], PO [1])

c. Evaluate Fourier Cosine Transform of the function 06 M

$$f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x \ge a. \end{cases}$$

(Level [2], CO [3], PO [2])

UNIT IV

6 a If the following represents valid p.d.f. then calculate k, Mean and Standard deviation given 07 M

X	0.5	1.5	2.5	3.5	4.5
P(X)	$2k$	k	$4k$	k	$2k$

Level [2], CO [4], PO [1])

b. Demonstrate that mean and variance of Binomial distribution are np and npq respectively. 07 M

(Level [2], CO [4], PO [1])

c. Under the Normal distribution 31% are below 35 and 9 % are above 60, identify the mean and Standard deviation of the distribution. Given A(z =0.5) = 0.19 and A(z =1.4) = 0.42. 06 M

(Level [2], CO [4], PO [1])

OR

7 a. If the following represents a valid p.d.f. then calculate k, P (0 < x <3), P(x > 2) given 07 M

$$p(x) = \begin{cases} \frac{kx^2}{1+x}, & 1 < x < 5 \\ 0 & , \text{elsewhere} \end{cases}$$

(Level [2], CO [4], PO [2])

b. If the conversation on telephone is a Poisson variate with mean 4 mins.,then calculate the probability that 07 M

(i) conversation lasts for more than 1 min.

(ii) conversation lasts between 2 and 3 mins.

(Level [2], CO [4], PO [1])

c. The Mean of an Exponential distribution is 8,then identify $E(x^2)$, P(1< x < 4), P(x > 5). 06 M

(Level [2], CO [5], PO [2])

UNIT –V

8 a. The joint distribution of two random variables X and Y are given by 07 M

X \ Y	1	2	3	4
1	0.06	0.05	.09	0.2
2	0.14	0.15	0.21	0.1

Determine the individual distributions of X and Y. Also verify whether X and Y are stochastically independent.

(Level [2],CO [5], PO[1])

b. A software engineer goes to his work place every day by motor bike or car. He never goes by same mode on two successive days; but if he goes by car on a day then he is equally likely to go by bike or car on the next day. Represent the transition matrix of his mode of transport. If he uses car on the first day of the week, find the probability that (i)bike is used (ii) car is used, on the fifth day. 07 M

(Level [2],CO[5], PO[2])

c. Define a stochastic matrix. Find unit fixed probability vector for the stochastic matrix P. 07 M

$$P = \begin{bmatrix} 0 & 1 & 0 \\ \frac{1}{8} & \frac{1}{2} & \frac{1}{8} \\ 0 & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

(Level [2], CO [5], PO [1])

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15MAT31

Third Semester B.E. Semester End Examination, Nov. / Dec. 2016-17

ENGINEERING MATHEMATICS III

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Answer FIVE full questions.*
2. *Units III and V are compulsory*
3. *choose one full question from each the remaining units*

UNIT - I

1 a. Use Regula falsi method to find a real root of the equation $x^3 - 2x - 5 = 0$. Correct to three decimal places. 06 M

(Level[3], CO[1], PO[1])

b. Find the real root of the equation $3x = \cos x + 1$ using Newton-Rophson method taking initial approximation $x_0 = 0.6$. Perform three iterations. 07M

(Level[1], CO[1], PO[1])

c. Apply fixed point iteration method to find the root of the equation $\cos x = 2x - 3$ up to 3 decimal places. 07 M

(Level[3], CO[1], PO[1])

OR

2 a. Use Taylor's series method up to 4^{th} derivatives to obtain y(0.1), given that $\frac{dy}{dx} = xy + 1, y(0) = 1$ 06 M

(Level[3], CO[1], PO[1])

b. Use Euler's modified method to find the solution at $x = 0.1$ correct to four decimal places of the differential equation $\frac{dy}{dx} = x + y$, and y=1 when $x = 0$ 07 M

(Level[3], CO[1], PO[1])

c. Apply Runge-Kutta method of fourth order to solve $\frac{dy}{dx} = x + y^2$ given that y=1 when $x = 0$ at $x = 0.2$ in one step. 7 M

(Level[2], CO[1], PO[1])

UNIT – II

3 a. Construct Fourier series for the function $f(x) = x + x^2 \quad -\pi \le x \le \pi$ 07 M

(Level[3], CO[2], PO[2])

b. Transform the function $f(x) = x \sin x \quad 0 < x < \pi$ into half range Fourier sine series 07 M

(Level[2], CO[1], PO[1])

c. Represent the following function in Fourier series up to first harmonic. 06 M

x	0	π/3	2π/3	π	4π/3	5π/3	2π
y	1	1.4	1.9	1.7	1.5	1.2	1

(Level[2], CO[2], PO[2])

OR

4 a. Construct Fourier series for the function $f(t) = 1 + t^2 \quad -1 \le t \le 1$ 07 M

(Level[3], CO[2], PO[1])

b. Transform the function $f(x) = x \sin x \quad 0 \le x \le \pi$ into half range Fourier sine series 07 M

(Level[2], CO[2,] PO[2])

c. Represent the following function in Fourier sine series up to second term. 06 M

x	0	1	2	3	4	5	6
y	5	6	9	7	4	11	5

(Level[2], CO[2], PO [1])

UNIT – III

5 a. Fit a straight line $y = a + bx$ by least square method to the data 06 M

x:	50	70	100	120
y:	12	15	21	25

(Level[2], CO[3], PO[1])

b. Find the parabola of the form $y = a + bx + cx^2$ which fits the following data by the method of least squares. 07 M

x:	−3	−2	−1	0	1	2	3
y:	4.63	2.11	0.67	0.09	0.63	2.15	4.58

(Level[2], CO[3], PO[1])

c. Find the correlation coefficient and the lines of regression for the following data 07 M

x:	1	2	3	4	5
y:	2	5	3	8	7

(Level[2], CO[3], PO[1])

UNIT – IV

6 a. If the following represents valid p.d.f. then calculate k, mean and s.d. 07 M

X	0	1	2	3	4	5	6
P(X)	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

(Level[1], CO[4], PO[2])

b. Demonstrate that mean and variance of an exponential distribution are $1/\alpha$ and $1/\alpha^2$ respectively 07 M

(Level[2], CO[4], PO[1])

c. Under the normal distribution 7% are below 35 and 89% are less than 60 identify the mean and standard deviation . Given A(z =1.2263)=0.39 and A(z =1.4757)=0.43 06 M

(Level[3], CO[4], PO[2])

OR

7 a. If the following represents a valid p.d.f. then compute k , P $(0<x<1)$, $P(-0.3< x <0.3)$ 07 M

$p(x) = k(x+1) \quad -1 \le x \le 1$

$= 0$ elsewhere.

(Level[1], CO[4], PO[1])

b. Demonstrate that mean and variance of a binomial distribution are 'np' and 'npq' respectively 07 M

(Level[2], CO[4], PO[2])

c. The mean of an exponential distribution is 5, identify $E(x^2)$, $P(1< x <4)$, $P(x > 5)$ 06 M

(Level[2], CO[4], PO[1])

UNIT –V

8 a. The joint distribution of two random variables x and y is given by the following table 06 M

x/y	0	1
0	0.1	0.2
1	0.4	0.2
2	0.1	0

Determine the marginal distribution of x and y
Verify whether x and y are independent.

(Level[2], CO[5], PO[1])

b. Each year a company executive changes his car. If he has a car of make A, he changes over to car of make B. If he has a car of make B, he changes over to car of make C. If he has a car of make C, he is just likely to change over to a car of make C. He is just likely to change over to a car of make C, B or A. Find transition matrix. If he uses the car C on the first year find the probability that he has car i) A, ii) B, iii) C on third year. 07 M

(Level[2], CO[5], PO[1])

c. Define stochastic process with an example. Also state the four types of stochastic process. 07 M

(Level[2], CO[5], PO[1])

15MAT31

Third Semester B.E. Makeup Examination, Dec. 2016-17

ENGINEERING MATHEMATICS III

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Questions from Unit III & V are compulsory*
2. *Answer any one full question from remaining each units.*

UNIT - I

1 a. Use Regula falsi method to extract the root of the equation $f(x) = 2x - \log_{10}x - 7 = 0$ upto 3 decimals. 07 M

(Level[3], CO[1], PO[1])

b. Apply Newton Raphson method to obtain the root of the equation $f(x) = x^2 - 45 = 0$ upto 3 decimals 07 M

(Level[3], CO[1], PO[1])

c. Find the root of the equation $f(x) = \cos x - 2x + 3 = 0$ upto 3 decimals using fixed point iteration method 06 M

(Level[2], CO[1], PO[1])

OR

2 a. Use Taylors series method upto 5[th] derivative term to obtain $y(0.3)$ for the differential equation $\frac{dy}{dx} = x + 2y, \quad y(0) = 2$ 07 M

(Level[3], CO[1], PO[1])

b. Apply Euler's modified formula to solve the differential equation $\frac{dy}{dx} = x^2 - y, \quad y(0) = 2$ at $x = 0.2$ in 2 steps 07 M

(Level[3], CO[1], PO[1])

c. Illustrate Runge Kutta fourth order method to solve $\frac{dy}{dx} = \frac{y-x}{y+x}$ $y(0) = 1$ at $x = 0.2$ in one step 06 M

(Level[2], CO[1], PO[1])

UNIT – II

3 a. Find Fourier series of $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$ 06 M

(Level[2], CO[2], PO[1])

b. Find half range sine series of $f(x) = x$ in $0 \le x \le 2$ 07 M

(Level[2], CO[2], PO[1])

c. Obtain the constant term and the coefficients of first sine and cosine terms in the Fourier expansion of y as 07 M

x:	0	1	2	3	4	5
y:	9	18	24	28	26	20

(Level[2], CO[2], PO[1])

OR

4 a. Find Fourier series for the function $f(x) = x^2$, in $-1 \le x \le 1$ 06 M

(Level[2], CO[2], PO[1])

b. Express $f(x) = \pi - x$ in $0 < x < \pi$ as cosine half range series. Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$ 07 M

(Level[2], CO[2], PO[1])

c. Expand y in terms of Fourier series up to first harmonic given that the values (y) of the displacement in inches of a certain machine part for the rotation x of the flywheel as 07 M

x:	0	$\pi/6$	$2\pi/6$	$3\pi/6$	$4\pi/6$	$5\pi/6$
y:	0	9.2	14.4	17.8	17.3	11.7

(Level[2], CO[2],PO [1])

UNIT – III

5 a. The straight line $y = a x^b$ for the following data using the method of least squares. 07 M

x	-1	0	1	2
y	2	5	3	0

(Level[3], CO[3], PO[1])

b. Fit the parabola $y = ax^2 + bx + c$ by method of least squares. 07 M

X	1	1.5	2	2.5	3	3.5	4
Y	1.1	1.3	1.6	2	2.7	3.4	4.1

(Level[2], CO[3], PO[1])

c. Calculate coefficient of correlation and identify both regression lines for the data below 06 M

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

(Level[2], CO[3], PO[1])

UNIT – IV

6 a. The probability density function of a variable x is 06 M

x:	0	1	2	3	4	5	6
y:	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

Find k, $p(x < 4)$, $p(x \geq 5)$, $p(3 < x \leq 6)$

(Level[2], CO[4], PO[1])

b. The probability that a pen manufactured by a company will be defective is $\frac{1}{10}$. *If 12 such pens are manufactured, then using Binomial distribution find the probability that* 07 M

i) Exactly two will be defective
ii) At least two will be defective

(Level[2], CO[4], PO[1])

c. In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and S.D of 60 hours.Using Normal distribution, estimate the number of bulbs likely to burn for 07 M

i) More than 2150 hours
ii) Less than 1950 hours and
iii) More than 1920 hours but less than 2160 hours.

Given that the normal distribution table values are $A(z = 1.8333) = 0.4664, A(z = 1.33) = 0.4082, A(z = 2) = 0.4772$

(Level[2], CO[4], PO[1])

OR

7 a. If $f(x)$ is a continuous p.d.f given by 06 M

$$f(x) = kx, \quad 0 \leq x < 2$$
$$= 2k, \quad 2 \leq x < 4$$
$$= -kx + 6k, \quad 4 \leq x < 6$$
$$= 0 \quad otherwise$$

Then find k and mean value of x

(Level[2],CO[4],PO[1])

b. Show that the mean and standard deviation of an exponential distributionare same. 07 M

(Level[2], CO[4], PO[1])

c. If the probability of bad reaction from a certain injection is 0.0001, determine the chance that out of 2000 individuals more than two will get a bad reaction.Use poisson distribution 07 M

(Level[2], CO[4], PO[1])

UNIT –V

8 a. The joint distribution of two random variables X and Y are given by 07 M

X \ Y	1	2	3
1	0.06	0.15	.09
2	0.14	0.35	0.21

Determine the individual distributions of X and Y. also verify whether X and Y are stochastically independent.

(Level[2] CO[5], PO[1])

b. A software engineer goes to his work place every day by motor bike or car.he never goes by on two successive days; but if he goes by car on a day then he is equally likely to go by bike or car on the next day. Represent the transition matrix of his mode of transport.If he uses car on the first day of the week,find the probability that (i)bike is used(ii) car is used on the fifth day. 07 M

(Level[2], CO[5], PO[1])

c. Describe about classification states of a Markov Chain with an example each 06 M

(Level[2], CO[5], PO[1])