MALLA REDDY COLLEGE OF ENGINEERING &TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade, ISO 9001:2008 Certified)

Maisammaguda, Dhulapally, Secunderabad – 500100.

DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

II B. TECH I SEMESTER

QUESTION BANK (2020 – 21)

R18-REGULATION

ELECTRONIC DEVICES AND CIRCUITS

II B.TECH I SEMESTER

QUESTION BANK FOR ECE

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

Autonomous Institution – UGC, Govt. of India

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2008 Certified)

Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

R18

B.Tech II Year I Semester Examinations, Model Paper I -2018

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours **Max. Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1a. Draw the V-I characteristics of a diode with zero cut-in voltage and equivalent resistance of 100Ω. Draw the load line if RL is also 100 Ω. [7]

1b. Explain V-I characteristics of pn junction Diode. [7]

(OR)

2a. Draw and explain the circuit diagram of full-wave rectifier with capacitor filter. Derive the Ripple factor equation. [7]

2b. Derive expressions for ripple factor, regulation and rectification efficiency of a Center tapped Transformer Full wave rectifier. [7]

SECTION-II

3. Draw a Self bias circuit and explain its operation. Calculate the Stability factor S [14]

(OR)

4. what is a load line? Explain its significance. [7]
Find the Q-point of self-bias transistor circuit with the following specifications: V_{CC} = 22.5V, R_L = 5.6kΩ, R_C = 1kΩ, R_I = 90kΩ, R_2 = 10kΩ, V_{BE} = 0.7V and β = 55. Assume $I_B >> I_{CO}$ [7]

SECTION-III

5a. Compare the three transistor amplifier configurations with related to A_i, Av, Ri & R_o

5b. For the emitter follower with Rs = 0.5K, R_L = 50K, h_{fe}= -50, h_{ie}= 1K, h_{oe} = 25μA/V, $h_{re}=2.5x10^{-4}$ Calculate A_i, Av, Ri & R_o

(OR)

6. Explain thermal runway and thermal stability [14]

SECTION-IV

7. Explain the construction and principle of operation of Depletion type N-Channel MOSFET [14]

(OR)

8. With the help of neat sketches and characteristic curves explain the construction & operation of a JFET and mark the regions of operation on the characteristics [14]

SECTION-IV

9a.	Explain principal operation of Tunnel diode.	[7]
9b.	Draw and Explain FET common source amplifier	[7]
	(OR)	
10a.	Explain the working of S.C.R	[7]
10b.	Explain working of photo diode	[7]

R18

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper II -2018

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours **Max. Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1a. Derive the equation for diffusion capacitance of a PN junction diode. [7]

1b. Explain different breakdown mechanisms in PN junction diode . [7]

(OR)

2a. A Full wave single phase rectifier makes use of 2 diodes, the internal forward resistance of each is considered to be constant and equal to 30Ω. The load resistance is 1KΩ. The transformer secondary voltage is 200-0-200V (rms).Calculate V_{DC}, I_{DC}, Ripple factor [7]

2b. Derive expression for FWR Rectifier i) DC load current ii) DC output voltage iii) Peak Inverse Voltage of each diode IV) Efficiency v) Ripple factor [7]

SECTION-II

3a. Draw the circuit diagram of a transistor in CE configuration and explain the output characteristics with the help of different regions. [7]

3b. Explain compensation techniques [7]

(OR)

4. Draw a collector to base bias circuit and explain its operation. Calculate the Stability factor S, S', S'' [14]

SECTION-III

5. Compare the three transistor amplifier configurations with related to A_I, A , R & Ro [14]

(OR)

6. Explain thermal runway and thermal stability [14]

SECTION-IV

7a. The field effect transistor is called a voltage-sensitive electronic control device.

Explain [7]

7b. Explain V-I characteristics of JFET [7]

(OR)

8a. Explain the construction and principle of operation of Enhancement mode N-channel

MOSFET. [7]

8b. Compare BJT & FET [7]

SECTION-V

9a. Draw and Explain FET Common source Amplifier [7]

9b. Explain working principal of PHOTO DIODE [7]

(OR)

10. Explain the working of Tunnel diode with help of energy band diagrams and Draw V-I Characteristics [14]

R18

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper III -2018

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

Time: 3 hours **Max. Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1a. Explain in detail, the reason for exponential rise in forward characteristic of a diode with suitable mathematical expression. [7]

1b. Explain and Derive expression for transition capacitance? [7]

(OR)

2a. Explain Full wave bridge rectifier with neat diagram? [7]

2b. Compare Half wave Full wave and bridge rectifier [7]

SECTION-II

3a. Draw and explain input-output characteristics of of CB configuration [7]

3b. Explain early effect and punch through effect [7]

(OR)

4a. Draw and explain fixed bias circuit, derive the stability factors S [7]

4b. Write a short notes on compensation techniques [7]

SECTION-III

5a. Explain thermal runaway and derive the condition for thermal stability [7]

5b. Define the hybrid parameters for a basic transistor circuit and give CE hybrid model. [7]

(OR)

6a. Summarize the salient features of the characteristics of BJT operatives in CE, CB and CC configurations? [7]

6b. Calculate the collector current and emitter current for a transistor with $\alpha_{D.C.} = 0.99$ and $I_{CBO} = 20\mu A$ when the base current is 50μ A. [7]

SECTION-IV

7a. Explain principle of operation JFET and draw the V-I characteristics [7]

7b. Explain how FET act as voltage variable resistor [7]

(OR)

8a. Compare Depletion MOSFET and enhancement MOSFET [7]

8b. Compare JFET and MOSFET [7]

SECTION-V

9a. Draw the FET self biasing circuit [7]

9b. Explain FET common drain amplifier [7]

(OR)

10. With neat energy band diagrams, explain the V-I characteristics of Tunnel diode indetail. Also explain the negative-resistance region in the characteristics and applications of Tunnel diode. [14]

CODE NO: R18A0405

NETWORK ANALYSIS AND TRANSMISSION LINES

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examination

NETWORK ANALYSIS AND TRANSMISSION LINES

Model Paper-1

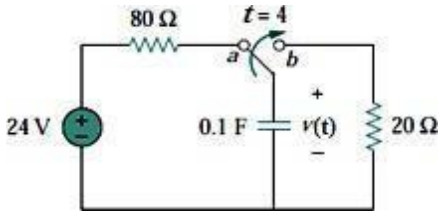
Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

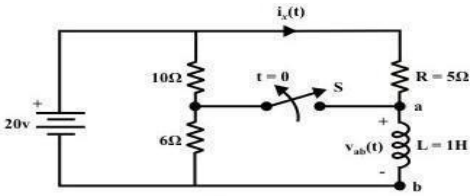
1. a.What are the initial conditions? Why are they needed? Explain [7M]

   b.The switch in the below figure has been in position *a* for a long time, At t = 4 s the Switch is moved to position *b* and left there. Determine $v(t)$ at t = 10 s.[7M]

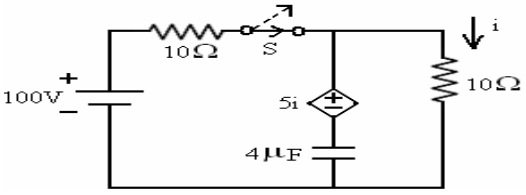


(OR)

2. a.In the given circuit the switch is opened at t=0.Find (i) $V_{ab}(0-)$ (ii) $i_x(0-)$ (iii) $i_x(0+)$ (i) $V_{ab}(0+)$ (v) $i_x(t=\infty)$ (vi) $i_x(t)$ for t>0. [7M]



   b.For the circuit shown below Figure, find the current equation when switch S is opened at t = 0+. [7M]



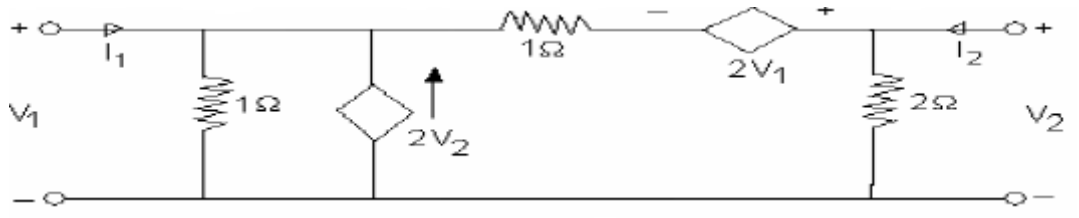
SECTION-II

3. a.Derive the relation between ABCD and 'Z'-parameters.[7M]

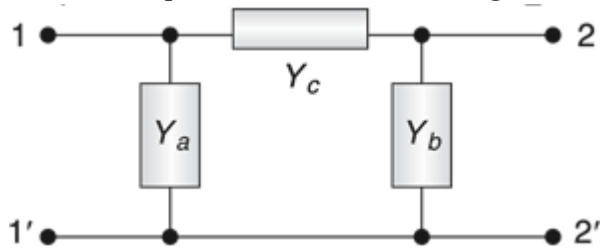
   b.Write the equations for Z, Y, ABCD, inverse ABCD, h, g parameters.
   A two port network has the following parameters: Z11 = 4 Ω, Z12 = 1 Ω, Z21 = 3 Ω and Z22 = 3 Ω. Calculate short circuit parameters. [7M]

(OR)

4. a)Determine h parameters of the following network[7M]



   b)Determine Y parameters of the following network[7M]



SECTION-III

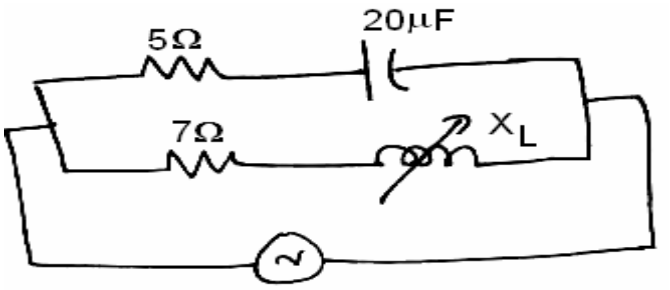
5. a) Explain the locus diagram of series R-L circuit when R is variable. [7M]

   b) Explain the locus diagram of series R-C circuit and when C is variable. [7M]

(OR)

6. a) Derive expression for half power frequencies of a R L C series network. [7M]
   b) Construct the admittance locus diagram and determine the variable inductance values so that the phase angle between the supply voltage and supply current is zero for the Fig.5.

   ω = 200 rad/s.[7M]



SECTION-IV

7. a) Derive the Condition for Distrotionless Transmission Line. [7]
   b) Measurements on a Transmission Line of length 120Km were made at frequency of 6000Hz.If Z_{OC}=520(-30deg) and Z_{SC}=640(43deg) find Z_o and P.[7]

OR

8. a. Explain the conditions which are used for minimum attenuation in transmission line [7]
b. The propagation constant of a lossy transmission line is $1+j2\ m^{-1}$ and its characteristic impedance is $20+j0\Omega$ at $\omega = 1$rad/s. Find R, C, L, G for the Line. [7]

SECTION-V

9. a)Derive the relation between reflection coefficient andcharacteristic impedance[7]
b)Write short notes on smith chart. [7]

OR

10. A transmission line of length 0.40λ has a characteristic impedance of 100Ω and is Terminated in a load impedance of $200 + j180\omega$. Find the [14]
    a. Voltage reflection coefficient
    b. Voltage standing waveratio
    c. Input impedance of the line.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examination

NETWORK ANALYSIS AND TRANSMISSION LINES

Model Paper-2

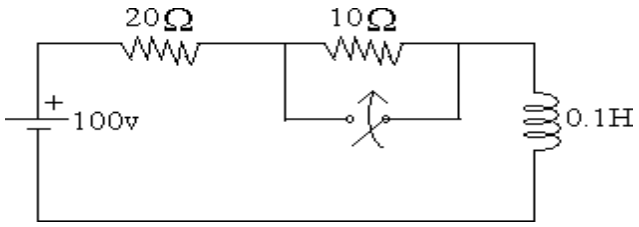
Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

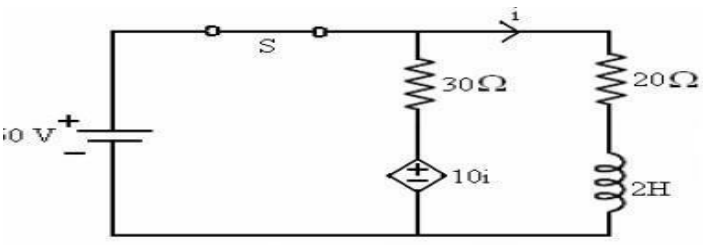
1. a) In a series RL circuit with R = 3 ohm and L = 1 H, a DC voltage of V = 50 V is applied at t = 0. Find the transient response of current and plot the response. [7M]

   b) A dc voltage of 100V is applied in the circuit shown in figure below and the switch is kept open. The switch K is closed at t = 0. Find the complete expression for the current. [7M]



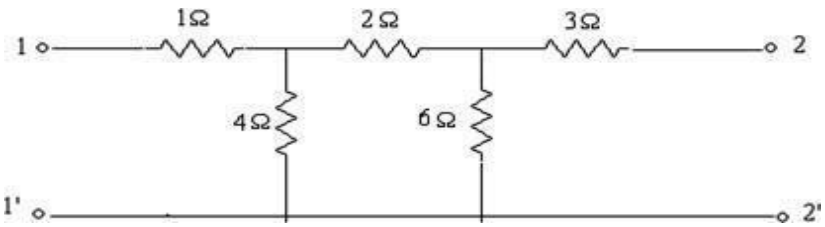
(OR)

2. For the below circuit (Fig. 1), find the current equation i(t), when the switch is opened at t = 0. [14M]



SECTION-II

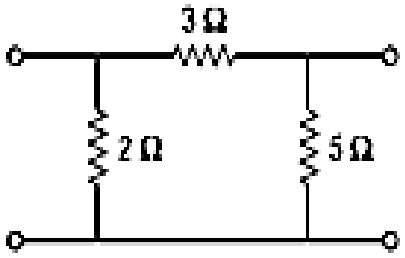
3. a) Obtain the transmission line parameters when the two transmission networks having the transmission parameters A1, B1, C1, D1 and A2, B2, C2, D2 are connected in cascade.[7M]



b) Obtain 'Y' – parameters for the given network shown in below figure. [7M]

(OR)

4. Determine the *g* parameters for the circuit shown in below figure. [14M]



SECTION-III

5. Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2 the lower and upper half power frequencies respectively. [14M]

(OR)

6. A voltage V = 50∠0 V is applied to a series circuit consisting of fixed inductivereactance X = 5ohms and a variable resistance R. Sketch the admittance and current locus diagrams. [14M]

SECTION-IV

7. a) Derive The Expression for Transmission Line Equation.[7]

   b) Given R = 10.4 Ω/mt L = 0.00367 H/mt

   G = 0.8×10^{-4} mhos/mt C = 0.00835 μF/mt.

   Calculate Z_0 and γ at1.0 KHz. [7]

OR

8. a)Derive the expression for α and β in terms of primary constants of a line[7]

   b) Explain transmission line parameters in detail. [7]

SECTION-V

9.a) Establish the relations for Z_{sc} and $Z_{oc\ of}$ rf lines and sketch their variation with βl. [7]

b) A 60ohm lossless line is 30m long and is terminated with a load of 75+j50ohms at 3MHz find its reflection coefficient, VSWR, if the line velocity is 60% of the velocity of light [7]

OR

10. a) Explain the principle of single stub matching.[7]

    b) Calculate the skin depth for the following conditions. [7]

    Copper $f=10^{10}$Hz, $\mu=\mu_0$, $\sigma=5.8x10^7$s/m

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examination

NETWORK ANALYSIS AND TRANSMISSION LINES

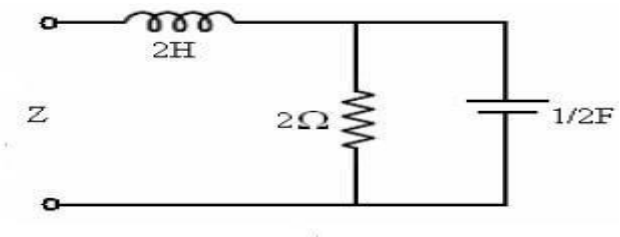
Model Paper-3

Time: 3 hours **Max. Marks: 70**

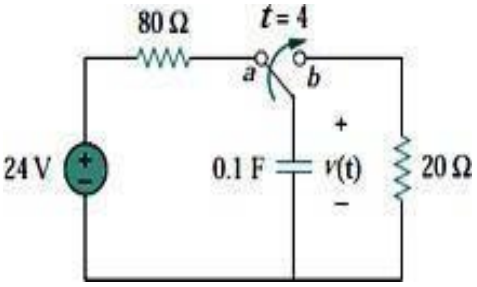
Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks. 5*14=70M

SECTION-I

1. a) Transform the below circuit in to 'S' domain and determine the Laplace transform impedance. [7M]

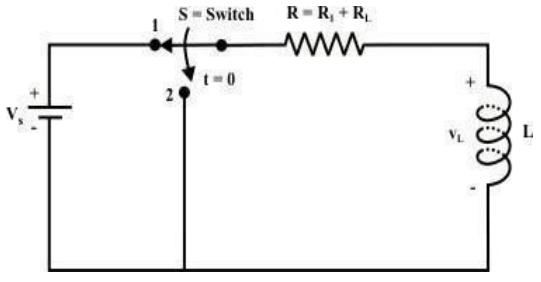


b) At t = 0, switch 1 in below figure is closed, and switch 2 is closed 4 s later. Find i(t) for t > 0. Calculate i for t = 2 s and t = 5 s. [7M]



(OR)

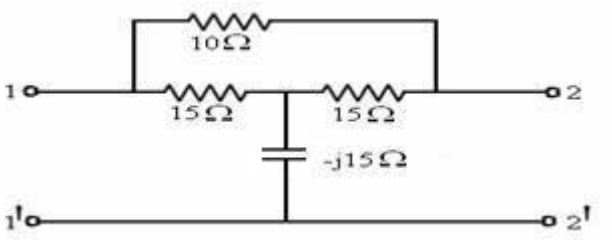
2. a) In the given circuit the switch is shifted from position 1 to 2 at t=0.Determine i(t) for t>0. [7M]



b) What are the initial conditions? Why are they needed? Explain. [7M]

SECTION-II

3. Determine the transmission parameter and hence determine the short circuit admittance parameters for the below circuit. [14M]



(OR)

4. Explain about the ABCD –parameters and derive the condition for symmetry and reciprocity. [14M]

SECTION-III

5. Explain the procedure to draw the locus diagram of R-L series circuit when L is varying. [14M]

(OR)

6. A series RLC circuit has to be designed so that it has a band width of 320 Hz and inductance of the coil is 0.2H. It is has to resonate at 350Hz, determine the resistance of coil and capacitance of condenser. If the applied voltage is 150V, determine the voltage across capacitor and coil. [14M]

SECTION-IV

7. a) Derive the attenuation constant and phase constant in terms of primary constants[7]

   b) Explain different types of loading for transmission lines.[7]

(OR)

8. a) Derive the characteristic impedance of a transmission line in terms of its line constants[7]

b) At 8MHz the characteristic impedance of a transmission line as 40 -j2ohms and the Propagation constant 0.01+j0.18 per meter. Find theprimary constant. [7]

SECTION-V

9. a) Explain the principal of singlestub matching [7]

   b) Write Short notes on Smith Chart [7]

OR

10.a) Derive the relation between reflection coefficient and characteristic impedance

   b) Write short notes on smith chart.[7+7]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examination

NETWORK ANALYSIS AND TRANSMISSION LINES

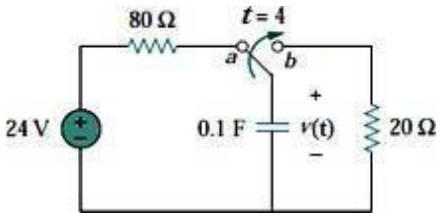
Model Paper-5

Time: 3 hours **Max. Marks: 70**

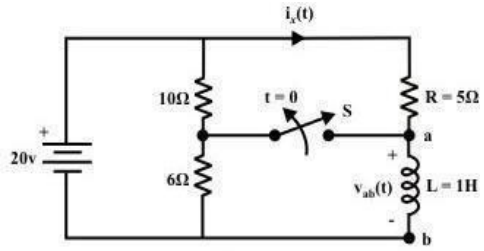
Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks. 5*14=70M

SECTION-I

1. a) The switch in the below figure has been in position *a* for a long time, At *t* = 4 s the switch is moved to position *b* and left there. Determine *v(t)* at *t* = 10 s. [7M]

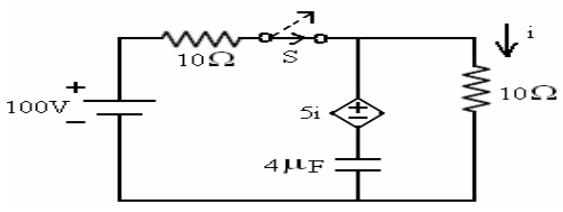


b) In the given circuit the switch is opened at t=0.Find (i) V_{ab} (0-) (ii) i_x (0-) (iii) i_x (0+) (iv) V_{ab} (0+) (v) i_x (*t*=∞) (VI) ix (t) for t>0. [7M]



(OR)

2. a)For the circuit shown below Figure, find the current equation when switch S is opened

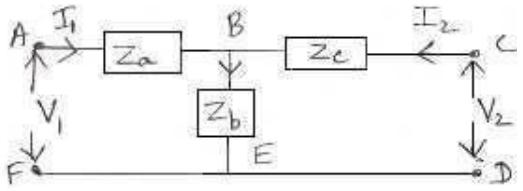


at t = 0.[7M]

b)In a series RL circuit with R = 3 ohm and L = 1 H, a DC voltage of V = 50 V is applied at t = 0. Find the transient response of current and plot the response. [7M]

SECTION-II

3. a)Find the Z parameters and Y parameters of the T- network shown in figure below. [7M]



b) Explain about driving point and transfer impedances. [7M]

(OR)

4. Draw the equivalent circuits of Z, Y, h, g parameters. [14M]

SECTION-III

5. Explain about the series resonance and derive the expression for resonant frequency. [14M]

(OR)

6. Define the bandwidth and derive the expressions for bandwidth of series resonating circuit and its relation with Q-factor. [14M]

SECTION-IV

7. Explain the conditions which are used for minimum attenuation in transmission lines. [14M]

(OR)

8. Derive the secondary conditions for loss less transmission line.[14M]

SECTION-V

9. a)Explain the principal of single stub matching [7]
   b)Write Short notes on Smith Chart [7]

(OR)

10. Derive the relation between reflection coefficient and characteristic impedance [14]

R18

Code No: R18A0403

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Probability Theory and stochastic Process

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1(a) Discuss about joint and conditional probability with relevant expressions. **[7M]**

(b) A pack contains 4 white and 2 green pencils, another pack contains 3 white and 5 green pencils. If one pencil is drawn from each pack, find the probability that **[7M]**

(i) Both are white

(ii) One is white another is green

OR

2(a) Explain various types of events with necessary examples. **[7M]**

(b) A machine gun fires 3 sec at the rate of 2400 bullets/minute. The probability of hitting the target is 0.4. Estimate the probability of exactly 50 bullets hitting the target. **[7M]**

SECTION-II

3(a) Describe with necessary expression about the properties of probability density function. **[7M]**

(b) A discrete random variable X takes values from 1 to 5 with probabilities given below. **[7M]**

X	1	2	3	4	5
P(X)	0.1	0.2	0.4	0.2	0.1

Compute the variance and skew of the random variable X

OR

4 Discuss about various standard distribution and density functions along with necessary expressions and graphical representation. **[14M]**

SECTION-III

5(a) Verify the properties of joint characteristic function. **[7M]**

(b) Two random variables X and Y have the joint PDF **[7M]**

$f_{XY}(x,y) = Ae^{-(2x+y)}$, $x, y \geq 0$

0 , *otherwise*

Evaluate (i) A (ii) Marginal PDF $f_X(x)$, $f_Y(y)$

OR

6(a) Explain the joint conditional density function with relevant expressions. **[6M]**

(b) Two random variables X and Y have means $\overline{X} = 1$ and $\overline{Y} = 2$ variances $\sigma_X^2 = 4$ and $\sigma_Y^2 = 1$ and a correlation coefficient $\rho_{XY} = 0.4$. New random **[8M]**

variables W and V are defined by V = - X +2Y, W = X + 3Y.
Deduce (i) The means (ii). The Variances (iii) The Correlations (iv) The correlation coefficient ρ_{VW} of V and W.

SECTION-IV

7(a) Briefly introduce the concept of random process and categorize its classifications with examples. **[6M]**

(b) Discuss about stationarity and elaborate various types of stationarity **[8M]**

OR

8(a) State and prove the properties of auto correlation function. **[8M]**

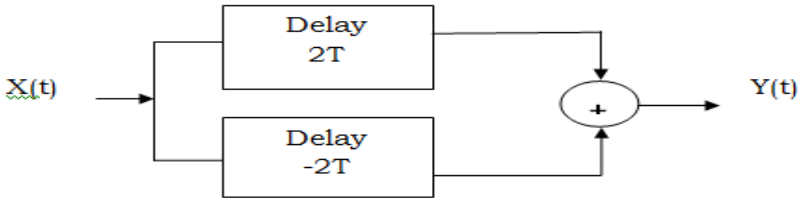
(b) A random process X(t) is defined as X(t) = A Cos($\omega_0 t$ + θ) where A, ω_0 are constants and θ is uniformly distributed random variable on the interval (0, 2π). Check X(t) is WSS or not **[6M]**

SECTION-V

9(a) For a given random process X(t) verify the following. **[9M]**

(i) $S_{\dot{X}\dot{X}}(\omega)=\omega^2 S_{XX}(\omega)$ (ii) $S_{XX}(-\omega)=S_{XX}(\omega)$ where $\dot{X}(t)=\frac{d}{dt}(X(t))$

(b) The power density spectrum of a random process is given by $S_{XX}(\omega)=\frac{16}{16+\omega^2}$. Analyze whether it is valid density or not. If it is transmitted through a system as shown in figure, find output Auto PSD. **[5M]**



OR

10(a) Develop the relationship between auto correlation and power spectral density. **[8M]**

(b) A stationary random process X(t)with autocorrelation $R_{XX}(\tau)=ae^{-b|\tau|}$ then find power spectral density. **[6M]**

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R17

Code No: R17A0403

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, May 2019

Probability Theory and Stochastic Process

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1 a). State and Prove the Bays theorem. **[7M]**

b). Define Random Variable? What are the functions to be a Random Variable. Explain the different types of Random Variables. **[7M]**

OR

2 a) if two dice are thrown randomly find the probability that **[10M]**

(i) sum of two numbers is greater than 10

(ii) Sum is between 2 and 5

(iii)Sum greater than or equal to 7

b). An experiment consists of rolling a die and flipping a coin. Let the random variable be a function X chosen such that (1) a coin head (H) outcome corresponds to positive values of X that are equal to the numbers that show up on the die and (2) a coin tail (T) outcome corresponds to negative values of X that are equal in magnitude to twice the number that shows on the die. Draw the corresponding sample space and show the mapping of X on to the real axis. **[4M]**

SECTION-II

3 a) List and explain properties of conditional distribution. **[7M]**

b) Define central moment, variance and skew **[7M]**

OR

4 a)Define characteristic function and moment generating function **[7M]**

b)Define Probability distribution function and state its properties. **[7M]**

SECTION-III

5 a)Show that the characteristic function and probability density function of a random variable forms a Fourier transform pair. State the central limit theorem **[7M]**

b) Two complex random variables are defined as $Z_1 = X_1 + jY_1$ *and* $Z_2 = X_2 + jY_2$

i. Find the covariance between Z_1 and Z_2 **[7M]**

ii. State the conditions when Z_1 and Z_2 are statistically

OR

6 a).Given the function **[7M]**

$$f_{XY}(x,y) = \begin{cases} b(x+y)^2, & -2 < x < 2 \text{ and } -3 < y < 3 \\ 0, & \text{elsewhere} \end{cases}$$

(i) Find the constant b such that this is a valid joint density function **[7M]**

(ii) Determine the marginal density functions.

b).Illustrate the procedure to calculate probability density function of sum of two random variables X and Y

SECTION-IV

7 a).Explain the following **[7M]**

i) Stationarity ii) Ergodicity iii) Statistical independence with respect to random processes

b).A random process is given as X(t) = At, where A is a uniformly distributed random variableon (0,2). Find whether X(t) is wide sense stationary or not **[7M]**

OR

8 a).Define autocorrelation function of a random process and write its properties .prove two of them. **[7M]**

b). Given auto correlation function of a stationary ergodic process with no periodic components is $R_{XX}(\tau)=25+\frac{4}{1+5\tau^2}$ Find Mean and Variance of Process X(t). **[7M]**

SECTION-V

9 a).Derive the relation between PSDs of input and output random process of an LTI system **[7M]**

b). f $X(t)$ and $Y(t)$ are uncorrelated random processes, then find the power spectral density of Z(t) if $Z(t) = X(t) + Y(t)$. Also find cross spectral density $S_{XY}(w)$. **[7M]**

OR

10 **a).** If $Y(t) = ACos(w_0t+\theta)+N(t)$, where 'θ' is a uniform random variable over $(-\pi,\pi)$,and N(t) is a band limited Gaussian white noise process with PSD=K/2. If 'θ' and N(t) are independent, find the PSD of Y(t). **[7M]**

b). Derive the expression for the Cross Spectral Density of the input Process X(t) and the output process Y(t) of an LTI system in terms of its Transfer function **[7M]**

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R17

Code No: R17A0403

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Regular Examinations, November 2018

probability Theory and Stochastic Process

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a). Define probability, set and sample spaces and random variables. **[7M]**

b).state and prove the total probability theorem. **[7M]**

OR

2 a). In a box there are 100 resistors whose resistances and tolerances are as shown in the table below. Let A be the event of drawing a 47Ω resistor, B be the event of drawing a resistor with 5% tolerance, and C be the event of drawing a 100Ω resistor. Find P(A/B), P(A/C) and P(B/C). **[10M]**

Resistance	Tolerance		
	5%	10%	Total
22	10	14	24
47	28	16	44
100	24	8	32
Total	62	38	100

b). Discuss the relative frequency approach and axiomatic approach of probability **[4M]**

SECTION-II

3 a). Find mean and variance of unifurom distribution function . **[7M]**

b). The exponential density function given by $f_X(x) = \frac{1}{b} e^{\frac{-(x-a)}{b}}$ $for\ x > a$

$= 0$ $for\ x < a$

Find out variance and coefficient of skewness. **[7M]**

OR

4 a).Define probality density function and prove its properties **[7M]**

b) State and prove the any four properties of Moment generating function and Characteristic Function. **[7M]**

SECTION-III

5 a)The joint density function of random variables X and Y is $f_{XY}(x,y) = 8xy, 0 < x < 1, 0 < y < x$. Find the conditional density functions f(x/y) and f(y/x). **[7M]**

b) Explain joint moments of two random variables. **[7M]**

OR

6 a)Two statistically independent random variables X and Y have mean values E[X] = 2 and E[Y] = 4. They have second moments $E[X^2] = 8$ and $E[Y^2] = 25$. Find Variance of W = 3X-Y **[7M]**

b). A discrete random variable X with pdf is given by

X	0	1	2	3	4
P(x)	0.2	0.15	0.3	0.15	0.2

Find the density function of Y for the transformation **[7M]**

$Y = 3X^3 - 3X^2 + 2$

SECTION-IV

7 a) With suitable example and mathematical equations, illustrate the difference between a wide-sense stationary and strict-sense stationary stochastic process. **[7M]**

b) A random process Y(t) = X(t)- X(t +τ) is defined in terms of a process X(t). That is at least wide sense stationary. Show that mean value of Y(t) is 0 even if X(t) has a non Zero mean value. **[7M]**

OR

8 a). Define cross correlation function of a random process and state and prove its properties **[7M]**

b) A random process is defined as $X(t) = ACos(\omega_0 t + \theta)$, where θ is a uniformly distributed random variable in the interval $(0, 2\pi)$. Check for its wide sense stationarity? A and ω_0 are constants. **[7M]**

SECTION-V

9 a)If the auto correlation function of was process is $R(\tau) = k.e^{-|\tau|}$,show that its spectral density is given by $s(w) = \dfrac{2}{1+\left(\dfrac{w}{k}\right)^2}$ **[7M]**

b. Discuss properties of cross power density spectrum **[7M]**

OR

10 a). Discuss the relation between power spectrum and auto correlation function **[7M]**

b). Derive the relation between input PSD and output PSD of an LTI system **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-1

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION-I

1. a) State and Prove Bayes' theorem. 7M
   b) Explain the axioms of probability. 7M

(OR)

2. a) An experiment consists of observing the sum of the outcomes when two fair dice are thrown. Find the probability that the sum is 7 and find the probability that the sum is greater than 10. 7M
   b) In a factory there are 4 machines produce 10%,20%,30%,40% of an items respectively. The defective items produced by each machine are 5%,4%,3% and 2% respectively. Now an item is selected which is to be defective, what is the probability it being from the 2nd machine. 7M

SECTION-II

3. a) The exponential density function given by 7M
   $f_X(x) = (1/b)e^{-(x-a)/b}$ $x > a$
   $= 0$ $x < a$ Find the mean and variance.
   b) Define Moment Generating Function and state and pove any 3 properties. 7M

OR

4. a) Explain the Binomial distribution & density function and also find its mean & variance. 10M
   b) State the properties of Conditional Distribution and Conditional Density function. 4M

SECTION-III

5. a) State and prove the density function of sum of two random variables. 7M
   b) The joint density function of two random variables X and Y is 7M

$$f_{XY}(x,y) = \begin{cases} \frac{(x+y)^2}{40} & ; -1 < x < 1 \text{ and } -3 < y < 3 \\ 0; & \text{otherwise} \end{cases}$$

Find the variances of X and Y.

OR

6. a) Let Z=X+Y-C, where X and Y are independent random variables with variance σ^2_X, σ^2_Y and C is constant. Find the variance of Z in terms of σ^2_X, σ^2_Y and C. 7M

b) State and prove the properties of joint characteristic function. 7M

SECTION-IV

7. a) Define Stationary Process and explain various levels of Stationary Processes. 7M

b) A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not. 7M

OR

8. a) X(t) is a stationary random process with a mean of 3 and an auto correlation function of 6+5 exp (-0.2 $|\tau|$). Find the second central Moment of the random variable Y=Z-W, where 'Z' and 'W' are the samples of the random process at t=4 sec and t=8 sec respectively. 10M

b) Find Autocorrelation function of response of LTI system. 4M

SECTION-V

9. a) Check the following power spectral density functions are valid or not 7M

$i)\ \frac{cos8(\omega)}{2+\omega^4}$ $ii)\ e^{-(\omega-1)^2}$

b) Derive the relation between input PSD and output PSD of an LTI system 7M

OR

10. a)Derive the relationship between cross-power spectral density and cross correlation function. 10M

b) State the properties of PSD. 4M

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-2

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION-I

1. a) Differentiate joint and conditional probabilities. 4M

   b) In a box there are 100 resistors having resistance and tolerance values given in table. Let a resistor be selected from the box and assume that each resistor has the same likelihood of being chosen. Event A: Draw a 47Ω resistor, Event B: Draw a resistor with 5% tolerance, Event C: Draw a 100Ω resistor. Find the individual, joint and conditional probabilities. 10M

Resistance (Ω)	Tolerance		Total
	5%	10%	
22	10	14	24
47	28	16	44
100	24	8	32
Total	62	38	100

OR

2.a)Two boxes are selected randomly. The first box contains 2 white balls and 3 black balls. The second box contains 3 white and 4 black balls. What is the probability of drawing a white ball? 7M

b) An aircraft is used to fire at a target. It will be successful if 2 or more bombs hit the target. If the aircraft fires 3 bombs and the probability of the bomb hitting the target is 0.4, then what is the probability that the target is hit? 7M

SECTION-II

3. a)Derive the Poisson density function and find its mean & variance. 7M

   b) State and prove the properties of probability density function. 7M

OR

4. a)If X is a discrete random variable with a Moment generating function of $M_x(v)$, find the Moment generating function of 10M

   i) Y=aX+b ii)Y=KX iii) Y= $\frac{X+a}{b}$

   b) Define conditional distribution and conditional density functions. 4M

SECTION-III

5. a) State and explain the properties of joint density function 7M
   b) The joint density function of random variables X and Y is 7M

$$f_{XY}(x,y) = \begin{cases} 8xy; & 0 \le x < 1, 0 < y < 1 \\ 0, & otherwise \end{cases}$$

Find f(y/x) and f(x/y)

OR

6. a)The input to a binary communication system is a RV X, takes on one of two values 0 and 1, with probabilities ¾ and ¼ respectively. Due to the errors caused by the channel noise, the output random variable Y, differs from the Input X occasionally. The behavior of them communication system is modeled by the conditional probabilities
   $P\left(\frac{Y=1}{X=1}\right) = \frac{3}{4}$ and $P\left(\frac{Y=0}{X=0}\right) = \frac{7}{8}$ Find
   i) The probability for a transmitted message to be received as 0
   ii) Probability that the transmitted message is a1. If the received is a 1. 10M
   b) Explain covariance of two random variables. 4M

SECTION-IV

7. Explain the following (5+5+4)M
   i) Stationary
   ii) Ergodicity
   iii) Distribution & density functions of random processes

OR

8. a) Given the RP X(t) = A cos(w_0t) + B sin (w_0t) where ω_0 is a constant, and A and B are uncorrelated Zero mean random variables having different density functions but the same variance σ^2. Show that X(t) is wide sense stationary. 7M

   b) For a stationary random process X(t) with periodic components the Auto correlation function is $R_{XX}(\tau)=36+4/(1+5\tau^2)$.Find E[X(t)],E[$X^2$(t)] and power in X(t). 7M

SECTION-V

9. A stationery random process X(t) has spectral density $S_{XX}(\omega)=25/(\omega^2+25)$ and an independent stationary process Y(t) has the spectral density $S_{YY}(\omega)= \omega^2/(\omega^2+25)$. If X(t) and Y(t) are of zero mean, find the: (7+7)M
   a) PSD of Z(t)=X(t) + Y(t) b) Cross spectral density of X(t) and Z(t)

OR

10. a)Find power spectral density of the random process whose autocorrelation function is
    $R_{XX}(\tau) = A\cos(\omega\tau)$ 7M
    b) The input to an LTI system with impulse response h(t)= $\delta(t) + t^2 e^{-at}$. U(t) is a WSS process with mean of 3. Find the mean of the output of the system. 7M

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-3

PROBABILITY THEORY AND STOCHASTIC PROCESSES

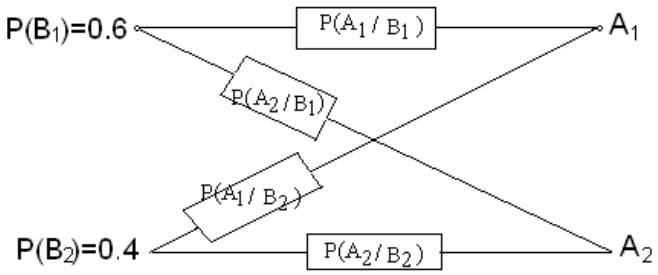
Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION-I

1. a) State and prove total probability thorem. 4M

   b) Determine probabilities of system error and correct system transmission of symbols for an elementary binary communication system shown in below figure consisting of a transmitter that sends one of two possible symbols (a 1 or a 0) over a channel to a receiver. The channel occasionally causes errors to occur so that a '1' show up at the receiver as a '0? And vice versa. Assume the symbols '1' and '0' are selected for a transmission as 0.6 and 0.4 respectively. 10M



OR

2. a) In a binary communication system, the errors occur with a probability of "p", In a block of "n" bits transmitted, what is the probability of receiving 7M
   i) at the most 1 bit in error
   ii at least 4 bits in error
   b) Define independent events and state the condition for independence of 2 and 3 events. 7M

SECTION-II

3. a) A random variable X has the distribution function 10M

   $F_X(x)= \sum_{n=1}^{12} \frac{n^2}{650} u(x-n)$

   Find the probability of i) P{-∞ < X ≤ 6.5} ii)p{X>4} iii) p{6< X ≤ 9}

b)) State and prove the properties of probability distribution function 4M

OR

4. a) Let X be a Continuous random variable with density function 7M

f(x)= $\frac{x}{9} + K$ 0≤x≤6

0 otherwise

Find the value of K and also find P{2 ≤ X ≤ 5}

b) Determine mean and vaiance of uniform distribution. 7M

SECTION-III

5. a) Let X and Y be the random variables defined as X=Cosθ and Y=Sinθ where θ is a uniform random variable over (0, 2π). Are X and Y Uncorrelated/Are X and Y Independent? 7M

b) Explain about Marginal Distribution and density Functions 7M

OR

6. a) Define and State the properties of joint cumulative distribution function of two random variables X and Y. 7M

b) A joint probability density function is $f_{x,y}(x,y) = \frac{1}{24}$ $0 < x < 6, 0 < y < 4$

0 else where

Find the expected value of the function g(X,Y)= $(XY)^2$ 7M

SECTION-IV

7. a) A Gaussian RP has an auto correlation function $R_{XX}(\tau)=\frac{6\sin(\pi\tau)}{\pi\tau}$. Determine a covariance matrix for the Random variable X (t) 7M

b) Derive the expression for cross correlation function between the input and output of a LTI system. 7M

OR

8. a) Derive the Expression for mean and mean square value of response of LTI system. 7M

b) Discuss in detail about stationary random process and its levels. 7M

SECTION-V

9. a) A random process Y(t) has the power spectral density $S_{YY}(\omega)=\frac{9}{\omega^2+64}$ 7M

Find i) the average power of the process

ii) The Auto correlation function

b) State and pove any3 properties of cross power spectral density 7M

OR

10. a) A random process has the power density spectrum $S_{YY}(\omega)=\frac{6\omega^2}{1+\omega^4}$. Find the average power in

the process. 7M

b) Find the auto correlation function of the random process whose psd is $\frac{16}{\omega^2+4}$ 7M

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-4

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION-I

1. Let A and B are events in a sample space S. Show that if A and B are independent, then so are
   a) A and $\bar{B}$ b) $\bar{A}$ and B c) $\bar{A}$ and $\bar{B}$ (5+5+4)M

OR

2. a)Show that the conditionalprobability satiesfies the axioms of probability. 7M
   b)Define and explain following with example 7M
   i))Equall likely events
   ii) Exhaustive events
   iii) Mutually exclusive events

SECTION-II

3. a) Verify the Characteristic function of a random variable is having its maximum magnitude at ω=0 and find its maximum value. 7M
   b) Find the Moment generating function of exponential distribution? 7M

OR

4. a)The probability density function of a random variable X is given by f(x) =$\frac{x^2}{81}$ for -3<x<6 and e qual to zero otherwise. Find the density function of Y=$\frac{1}{3}$(12-x) 7M
   b) Explain about Binomial Distribution and density function with neat plots. 7M

SECTION-III

5. a)Explain conditional distribution and density function of two random variables. 10M
   b) Let X be a random variable with mean E[X]=3 and Var(X)=2.Let another random variable Y is defined as Y= -6X+22 find m_{20},$m_{01}$and m_{11}. 4M

OR

6. a) Two random variables X and Y have zero mean and variance $\sigma_X^2 = 16$ and $\sigma_Y^2 = 36$ correlation coefficient is 0.5 determine the following 7M

i) The variance of the sum of X and Y

ii) The variance of the difference of X and Y

b)State and prove the properties of joint characteristic function. 7M

SECTION-IV

7.a) A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not. 7M

b)State and prove the properties of auto correlation function. 7M

OR

8. Explain the following (5+5+4) M

a) Stationarity

b) Ergodicity

c) Statistical independence with respect to random processes

SECTION-V

9. a)Find the cross correlation function corresponding to the cross power spectrum 7M

$S_{XY}(\omega)=\frac{6}{(9+\omega^2)(3+j\omega)^2}$

b) Write short notes on cross power density spectrum. 7M

OR

10. a) Consider a random process X(t)=cos($\omega t + \theta$)where ω is a real constant and $\theta$is a uniform random variable in (0, π/2). Find the average power in the process. 7M

b) State and prove the relation between auto corelation and power spectrum. 7M

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-5

PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION-I

1. a) An experiment consist of rolling a single die. Two events are defined as A = { 6 shows up}: and B= {2 or 5 shows up} 7M
   i) Find P(A) and P(B)
   ii) Define a third event C so that P(C) = 1-P(A)-P(B)
   b) Define probability as relative frequency and explainits properties. 7M

OR

2. a) Explain relative frequency definition and classical definition of probability? 7M
   b) Explain about conditional probability. 7M

SECTION-II

3. a) Write short notes on Gaussian distribution and also find its mean? 7M
   b) Consider that a fair coin is tossed 3 times, Let X be a random variable, defined as X= number of tails appeared, find the expected value of X. 7M

OR

4. a) Find the characteristic function and first moment for 7M

   $f_X(x)=(1/b)\exp(-(x-a)/b) \quad x \geq a$

   $=0 \qquad \text{else}$

   b) Find the probability of getting a total of 5 or 11, when tossing a pair of fair dice. 7M

SECTION-III

5. A certain binary system transmits two binary states X = +1 and X = -1 with equal probability. There are three possible states with the receiver, such as Y = +1, 0 and -1. The performance of the communication system is given as (5+5+4)M
   P(y = +1/X = +1) =0.2;
   P(Y= +1/X= -1) = 0.1; P(Y = 0/X = +1) = P(Y = 0/X = -1) = 0.05. Find
   a) P(Y = 0) b) P(X = +1/Y = +1)
   c) P(X = -1/Y = 0).

OR

6. Two random variables X and Y have the joint pdf is 14M

$$f_{x,y}(x,y)=\begin{cases} Ae^{-(2x+y)} & x,y\geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

i. Evaluate A
ii. Find the marginal pdf's
iii. Find the marginal pdf's
iv. Find the joint cdf
v. Find the distribution functions and conditional cdf's.

SECTION-IV

7. Explain about the following random process (5+5+4) M
(i) Mean ergodic process
(ii) Correlation ergodic process
(iii) Gaussian random process

OR

8. a)State and prove the cross correlation function properties. 7M
b) If X(t) is a WSS random process with auto correlation function $R_{XX}(\tau)=Ae^{-\alpha|\tau|}$ determine the mean , mean square value and second order moment of the random variable { X(8)-X(5) }. 7M

SECTION-V

9. a) The power spectrum density function of a stationary random process is given by 7M

$$S_{XX}(\omega)=\begin{cases} A, & -K<\omega<K \\ 0, & \text{other wise} \end{cases}$$

Find the auto correlation function.
b) Derive the expression for power spectrum density of response of LTI system. 7M

OR

10. a) Derive the expression cross power between input and output random process X(t) and Y(t) of LTI system. 7M
b) Find the cross power spectral density for $R_{XY}(\tau)=\frac{A^2}{2}\sin(\omega_0\tau)$. 7M

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-I

SIGNALS AND SYSTEMS

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

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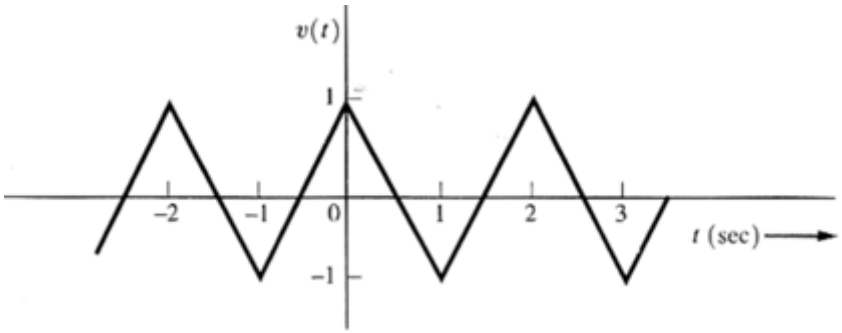
SECTION – I

1. (a) Write short notes on the following signals: [8M]
   (i) Unit step (ii) Unit impulse
   (iii) Unit ramp (iv)Signum function
   (b)Write the properties of Impulse function [6M]

(OR)

2. Find the exponential Fourier series and plot the magnitude and phase spectra of the following triangular wave form. [14M]



SECTION – II

3. State and prove following properties of Fourier transform.
   (i)Convolution in time domain [5M]
   (ii) Differentiation in time domain [5M]
   (iii) Time shifting [4M]

(OR)

4. a) When does aliasing occur? What is anti-aliasing filter? [6M]
   b) Explain various sampling methods? [8M]

SECTION – III

5. a) Define following properties of a continuous time system with simple examples.
   (i) Linearity and Non-linearity (ii) Time variance and Time invariance [6M]
   b) Examine the following systems with respect to above properties.

(i) $y(t) = \sin[x(t)]$ (ii) $y(t) = \text{sint}.x(t)$ [8M]

(OR)

6. a) Explain the filter characteristics of linear systems [7M]
   b) Obtain the conditions for distortion less transmission through a system. [7M]

SECTION – IV

7. a)Explain graphical representation of convolution with example [7M]
   b) Compare energy spectral density and power spectral density. [7M]

(OR)

8. Determine and sketch auto correlation function of a periodic signal X(t)= $A \sin(\omega_0 t + \theta)$. Also sketch its power spectral density. [14M]

SECTION – V

9. State and prove initial value theorem and final value theorem with respect to Laplace transform. [14M]

(OR)

10. Prove that the sequences $x_1[n] = a^n u[n]$ and $x_2[n] = -a^n u[-n-1]$ have same Z transform and differ only in ROC. Plot their ROCs. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-II

SIGNALS AND SYSTEMS

Time: 3 hours **Max. Marks: 70**

Answer one question from each section.

SECTION – I

1. (a) Define and discuss various elementary continuous time signals. Indicate them graphically [10M]
   (b) What are the types of representation of discrete time signals? Represent a sequence in all types. [4M]

(OR)

2. State and prove any two properties of the Fourier series. [14M]

SECTION – II

\ 3. Obtain the Fourier transform of the following: [14M]

i. $x(t)=A\ \mathrm{Sin}\ (2\pi f_c t).\ u(t).$

ii. $x(t)=f(t).\mathrm{Cos}(2\pi f_c t+\Phi).$

(OR)

4.State and prove the following properties of Fourier transform.
(i) Multiplication in time domain. [5M]
(ii) Linearity. [5M]
(iii) Frequency shifting [4M]

`

SECTION – III

5. A continuous time signal is given as: x(t) = 8 cos200πt Determine [14M]
   i.Minimum sampling rate
   ii.If fs=400Hz what is discrete time signal obtained after sampling.
   iii.If fs=150Hz what is discrete time signal obtained after sampling.

(OR)

6. Define Nyquist rate. Compare the merits and demerits of performing sampling using impulse, Natural and Flat-top sampling techniques. [14M]

SECTION – IV

7. State and Prove Properties of auto correlation and cross correlation functions? [14M]

(OR)

8. Prove that for a signal, auto correlation function and power spectral density forms a Fourier transform pair. [14M]

SECTION – V

9. Find the Laplace transform of the function

   (i) $f(t) = A \sin \omega_0 t$ for $0 < t < T/2$ [7M]

   (ii) $f(t) = e^{-at} \cos(\omega_c t + \theta)$ [7M]

   (OR)

10. Find the Laplace transform of the periodic square wave of amplitude range (-A, A) and time period 2T. [14M]

$$F(s) = \frac{17s^3 + 7s^2 + s + 6}{s^5 + 3s^4 + 5s^3 + 4s^2 + 2s}$$

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-III
SIGNALS AND SYSTEMS

Time: 3 hours Max Marks: 70

Answer the following Questions

SECTION – I

1. (a)What are the basic operations of signals? Illustrate with an example [10M]
   (b)Distinguish between continuous-time and discrete –time signals. [4M]

(OR)

2. Derive the expressions for the trigonometric Fourier series coefficients [14M]

SECTION – II

3. (a) State and Prove Modulation theorem. [7M]
   (b)Using the modulation theorem find out the Fourier transform of RF pulse Given as $y(t) = A\ rect(t/\tau)\ Cos\ 2\pi f_c t$. [7M]

(OR)

4. Explain sampling theorem for Band limited Signals [14M]

SECTION – III

5. (a) Explain causality and physical reliability of a system and hence give Paley-Wiener criterion. [6M]
   (b) Obtain the relationship between the bandwidth and rise time of ideal low pass Filter [8M]

(OR)

6. Distinguish between linear and non linear systems with examples and Consider a stable LTI System characterized by the differential equation $dy(t)/dt + 2y(t) = x(t)$. Find its impulse response. [14M]

SECTION – IV

7. (a) The waveform $V(t)= e^{-t}/T\ u(t)$ is passed through a high pass RC circuit having a time constant T and find the energy spectral density at the output of the circuit. [7M]

   (b)Find the cross correlation of the functions $\sin \omega t$ and $\cos \omega t$. [7M]

(OR)

8. (a) Write the Procedure to find the convolution of two signals. [7M]
   (b) Find the convolution of the following signals by graphical method. $x(t)=e^{-3t}u(t), h(t)=u(t+3)$ [7M]

SECTION – V

9. Determine the function of time x(t) for each of the following Laplace transforms And their associated regions of convergence [14M]

(OR)

10. Using the Power Series expansion technique, find the inverse Z-transform of The following X (Z) [14M]

i. $X(Z) = \frac{Z}{2Z^2-3Z+1}$ $|Z| < \frac{1}{2}$

ii. $X(Z) = \frac{Z}{2Z^2-3Z+1}$ $|Z| > 1$

(b) Find the inverse Z transform of

$X(Z) = \frac{Z}{Z(Z-1)(Z-2)^2}$ $|Z| > 2$

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-IV
SIGNALS AND SYSTEMS

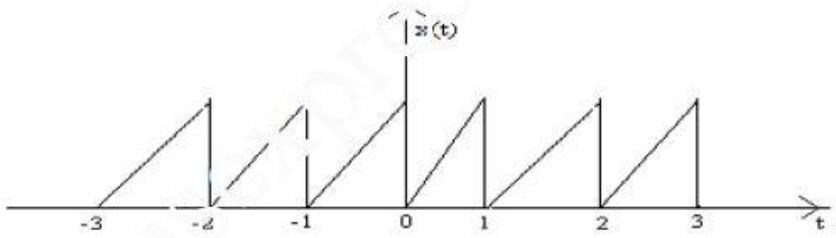
Time: 3 hours Max Marks: 70

Answer the following Questions

1. (a) How are signals classified? Differentiate between them. [10M]
   (b)Write short notes on Complex exponential signals and Sinusoidal signals [4M]

(OR)

2. Find the exponential Fourier series for the saw tooth waveform shown in figure. Plot the magnitude and phase spectrum. [14M]



SECTION – II

3. Find the Fourier transform of the following functions. [14M]
   i. Impulse function f(t).
   ii. DC Signal.
   iii. Unit step function
   iv Signum function

(OR)

4. (a) Explain the reconstruction of the signal from its samples [7M]
   (b) Explain Flat Top Sampling Method [7M]

SECTION – III

5. (a) What is an LTI system? Explain its properties. Derive an expression for the Transfer function of an LTI system. [7M]
   (b) Obtain the conditions for the distortion less transmission through a system. What do you understand by the term signal bandwidth? [7M]

(OR)

6. (a) Explain how input and output signals are related to impulse response of a LTI System. [7M]
   (b) Explain the ideal filter characteristics [7M]

SECTION – IV

7. (a) Derive Relation between Auto Correlation Function and Energy spectral density Function [7M]

   (b) Compare ESD and PSD [7M]

(OR)

8. (a) A signal $x(t)=e^{-2t}u(t)$ is passed through an idle LPF with cut off frequency of one radian /sec .

   (i) Test whether the input is an energy signal. [7M]

   (ii) Find the input and Output Energy [7M]

SECTION – V

9. (a) Derive relationship between Fourier Transform and Laplace Transform [7M]

   (b)Explain the properties of the region of convergence of X (z). [7M]

(OR)

10 (a) Consider the sequence Find X[Z]. [7M]

$$x[n] = \begin{cases} a^n & 0 \le n \le N-1, a > 0 \\ 0 & otherwise \end{cases}$$

(b) Find the Z-transform of $x(n) = \cos(n\omega)u(n)$. [7M]

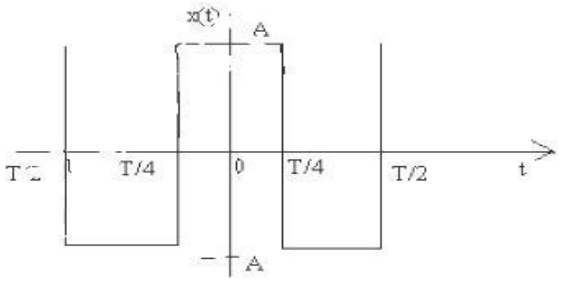
MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.Tech II year – I Semester Examinations, Model Paper-V
SIGNALS AND SYSTEMS

Time: 3 hours Max Marks: 70

Answer the following Questions

SECTION – I

1. (a)State the Dirichlet's condition for Fourier series. [7M]
   (b)Find Trigonometric Fourier series for a periodic square waveform shown in figure which is symmetrical with respect to the vertical axis. [7M]



(OR)

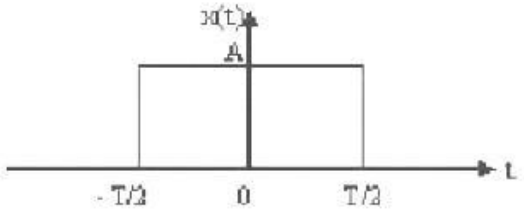
2. (a) Obtain the Fourier series representation of an impulse train given by [7M]

$$x(t) = \sum_{n=-\alpha}^{\alpha} \delta(t - n\tau_0).$$

   (b)Derive polar Fourier series from the exponential Fourier series representation and hence prove that Dn = 2 |Cn| [7M]

SECTION – II

3. (a) Prove the time scaling property of Fourier transform and hence find the Fourier Transform of f (t) = $e^{-0.5t}$. [7M]
   (b) Obtain the Fourier transform of Rectangular pulse of duration T and amplitude A as shown in figure [7M]



(OR)

4. (a) Explain the concepts of Impulse function and Sinc function. [7M]
   (b)Find the Fourier transform of the Rectangular Pulse and plot its amplitude and phase [7M]

SECTION – III

5. Explain the difference between a time invariant system and time variant system? What do you understand by the filter characteristics of a linear system. Explain the condition for causality of a LTI System? [14M]

(OR)

6. (a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. [7M]

(b)Obtain the conditions for the distortion less transmission through a system. What do you understand by the term signal bandwidth? [7M]

SECTION – IV

7. State and Prove Properties of auto correlation and cross correlation functions? [10M]

(OR)

8. Prove that for a signal, auto correlation function and power spectral density forms a Fourier transform pair. [14M]

SECTION – V

9. (a) Find the Z-transform of [7M]

$$x[n] = \left(\frac{1}{2}\right)^n u[n] + \left(\frac{1}{3}\right)^n u[-n-1].$$

(b) Derive relationship between z and Laplace Transform [7M]

(OR)

10. (a) Explain the properties of the region of convergence of X (z). [7M]

(b) Discuss in detail about the double sided and single sided Z-transform. Correlate Laplace transform and Z transform in their end use [7M]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech II year – I Semester Examinations, Model Paper-VI

SIGNALS AND SYSTEMS

Time: 3 hours Max Marks: 70

Answer the following Questions

SECTION – I

1. (a) Determine the trigonometric Fourier series of a full wave rectified Function. [14M]

(OR)

2. (a) Sketch the signal and find whether the signal are energy signal or power signal [8M]

(i) $e^{-5t}\ u(t)$ (ii) u(t)-u(t-4)

(iii) Sin wt u(t-1) u(9-t) (iv) u(t)+u(t-2)

(b) Find which of the signals are energy signals and Power signals? [6M]

(i) $(\frac{1}{2})^n\ u(n)$ (ii) $e^{j[(\frac{\pi}{8})n+(\frac{\pi}{2})n]}$

SECTION – II

3. (a) Find the Fourier transform of a gate pulse of unit height, unit width and centered at t=0 [7M]

(b) Find the Fourier Transform of f (t) = t Cos 2t. [7M]

(OR)

4. (a) Determine the Fourier transform of the sinusoidal pulse shown below: [7M]

(b) Determine the Fourier transform of f(t) = $e^{-a|t|}$ sgn (t) . [7M]

SECTION – III

5. (a) Explain flat top sampling. [7M]

(b)Determine the Nyquist sampling rate and Nyquist sampling interval for the signals. [7M]

(i) sinc(100πt)

(ii) sinc2(100πt)

(iii) sinc(100πt) + sinc(50πt)

(iv) sinc(100πt) + 3 sinc2(60πt)

(OR)

6. (a) With the help of graphical example explain sampling theorem for Band limited Signals. [7M]

(b)Explain briefly about Band pass sampling [7M]

SECTION – IV

7. (a) If V(t) = Sin $\omega_0 t$. find R(τ) and find energy spectral density GE (f) = Fourier transform of R (τ) [8M]

   (b)Use the convolution theorem to find the spectrum of x (t) = A Cos2 $\omega_c t$. [6M]

(OR)

8. (a) The signal V(t) = cos ω_0 t + 2sin 3 ω_0 t + 0.5 sin 4ω_0 t is filtered by an RC Low pass filter with a 3 dB frequency. fc =2f_0. Find the output power S_o [8M]

   (b)State Parsvel's theorem for energy and power signals. [6M]

SECTION – V

9. Explain the Frequency differentiation and Time convolution properties of Laplace [14M]

$$F(s) = \frac{17s^3 + 7s^2 + s + 6}{s^5 + 3s^4 + 5s^3 + 4s^2 + 2s}$$

(OR)

10. Explain the Step and Impulse responses of Series R-C circuit using Laplace Transforms. [14M]

Asha

R18

Code No: R18A0404

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Switching Theory & Logic Design

(ECE)

Roll No										

Time: 3 hours Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1	a)	Convert the following decimal numbers to binary i) 1231 ii) 673.23 iii) 10^4 and iv) 1998	[7M]
	b)	Find the 1's and 2's complements of the following 8- digit binary numbers i) 10000001 ii) 10000000 iii) 00000001 and iv) 00000000	[7M]

OR

2	a)	Convert the hexadecimal number F3A7C2 to binary and octal	[4M]
	b)	Given the two binary numbers X=1010100 and Y= 1000011, perform the subtraction i) X – Y and ii) Y – X using 2's complements	[6M] [4M]
	c)	Explain about Gray Codes	

SECTION-II

3	a)	Find the compliment of the function $F_1 = x'yz' + x'y'z$ and $F_2 = x(y'z' + yz)$ by applying DeMorgan's Theorem.	[7M]
	b)	Simplify the Boolean function F (A, B, C, D) = (0, 2, 4, 6, 9, 13,15) by using K- map.	]7M[

OR

4	a)	Implement the following Boolean function with 8x1 multiplexer. F (A, B, C, D) = $\sum$ (0, 3, 5, 6, 8, 9, 14, 15)	[7M]
	b)	Implement the following function with NAND gates. F (x, y, z) = $\sum$ (0,6)	[7M]

SECTION-III

5	a)	Draw the logic diagram of JK flip-flop and write its characteristic table and characteristic equation.	[7M]
	b)	Draw the logic diagram of SR flip-flop and write its characteristics.	[7M]

OR

6	a)	Explain about SR and D flip-flop with neat diagrams	[7M]
	b)	Draw the logic diagram of T- flip-flop and write its characteristic table.	[7M]

SECTION-IV

7	a)	Construct 4-bit bidirectional shift register with parallel load	[7M]
	b)	What is ring counter? Construct Johnson ring counter	[7M]

OR

8	a)	Discuss the principle and operation of 4-bit ripple counter and draw its Timing diagram.	[8M]
	b)	Construct a 4-bit buffer register with parallel load and explain its working	[6M]

SECTION-V

9	a)	Explain Mealy and Moore models of finite state machine in detail	[6M]
	b)	Explain the Partition techniques in sequential circuits.	]8M[

OR

10	a)	Discuss the Finite state machine capabilities and limitations in briefly.	[4M]
	b)	Explain about the Merger Graphs & Merger Tables	[10M]

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R17

Code No: R17A0407

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, April/May 2019

Switching Theory and Logic Design

(EEE & ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1	a. Convert the number $(127.75)_8$ to base 10, base 3, base 16 and base 2.	**[7M]**
	b. Given that $(64)_{10} = (100)_b$, determine the value of b. Perform the binary arithmetic operations on (+12)-(4) using signed 2'scomplement method.	**[7M]**
	OR	
2	A receiver has received a message code 1110110 which is an even parity Hamming code. Determine whether the message code has any error. If so correct the error. Give proper reasoning for your answer.	**[14M]**

SECTION-II

3	a.A majority circuit is a combinational circuit whose output is equal to 1 if the input variables have more 1's than 0's. The output is 0 otherwise.Design a 3 input majority circuit and implement it using NAND gates.	**[7M]**
	b.Represent the decimal number 6248 in binary.	**[7M]**
	OR	
4	Simplify the follwoing function using Quine Mc Cluskey method f(w,x,y,z)= $\sum_m(4,5,6,7,12,13,14)+\sum_d(1,9,11,15)$	**[14M]**

SECTION-III

5	Design full adder and realize full adder using two adders and logic gates .	**[14M]**
	OR	
6	Construct a 3*8 decoder using logicgates and its truth table.	**[14M]**

SECTION-IV

7	Write the conversion procedures of the flip-flops. Convert T-flip-flop to JK- flip-flop.	**[14M]**
	OR	
8	What is excitation table? Write the excitation tables for the following flip-flops. i) SR flip-flop ii)JK flip-flop iii)T flip-flop	**[14M]**

SECTION-V

9	Design and explain the operation of Bi-directional shift register.	**[14M]**
	OR	
10	Design a modulo-12 up synchronous counter using T flip-flop and draw the circuit diagram.	**[14M]**

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R15

Code No: R15A0407

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, April/May 2019

Switching Theory and Logic Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

****

PART-A (25 Marks)

1). a	Convert the $(1234.23)_{16}$ into Decimal.	**[2M]**
b	Convert the 1726_8 into Decimal and then to Binary	**[3M]**
c	Write about code convertors.	**[2M]**
d	Explain about prime implicants.	**[3M]**
e	Write the characteristic and excitation equations of D flip flop.	**[2M]**
f	List out difference between latch and flip-flop.	**[3M]**
g	Discuss about racing around condition in J-K flip-flop.	**[2M]**
h	What are the approaches to the Design of Synchronous Sequential Finite State Machines.	**[3M]**
i	How do you obtain the set of all maximal compatibilities from the merger table?	**[2M]**
j	What is the Moore machine?	**[3M]**

PART-B (50 MARKS)

SECTION-I

2	Minimise the following Boolean function using K-map and design a logic circuit using NAND gates. $F=\Sigma m\ (0,3,4,7,8,10,12,14)+d(2,6)$	**[10M]**
	OR	
3	Convert the following to Binary and then to gray code (a) 1001_{16} (b) $ABEF_{16}$ (c) 7623_8 (d) 1234_8 .	**[10M]**

SECTION-II

4	Discuss about carry look ahead adder with a neat sketch.	**[10M]**
	OR	
5	Design a combinational logic circuit for 4 bit Binary-to-BCD code converter.	**[10M]**

SECTION-III

6	Explain the operation of SR flip flop with the help of its truth table and a neat sketch.	**[10M]**
	OR	
7	Draw the schematic circuit of JK flip-flop and explain the operation with the help of truth table.	**[10M]**

SECTION-IV

8	Design Mod -5 synchronous up counter using T- flip flops.	**[10M]**
	OR	
9	Realize D-FF and T-FF using JK-FF.	**[10M]**

SECTION-V

10	Explain the procedure of state minimization using the partition technique	**[10M]**
	OR	
11	Explain the procedure of state minimization using the merger graph and meger table.	**[10M]**

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Code No: R15A0407

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, Nov/Dec 2018

Switching Theory and Logic Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART – A (25 Marks)

1. (a) Express the following numbers in decimal [2M]
   i) $(11010.0111)_2$ ii) $(FAFA.B)_{16}$
   (b) Find the complement of [3M]
   i) (x'+y'+z)(x'+y)(x+z) ii) (A'B+CD)E'
   (c) Discuss the advantages of priority encoder. [2M]
   (d) Design a full subtractor logic circuit. [3M]
   (e)Implement 8:1 MUX using 4:1 and 2:1 MUX. [2M]
   (f) Draw the logic diagram of SR flip flop. [3M]
   (g) Differentiate between latch and flip flop [2M]
   (h) Explain how a counter can be used as a frequency divider circuit. [3M]
   (i) What is distinguishable state ? [2M]
   (j) Differentiate between moore and mealy FSMs. [3M]

PART –B (50 Marks)

SECTION – I

2. (a)Simplify the Boolean expression xy'z+x'y'z+w'xy+wx'y+wxy and realize it using basic gates. [5M]
   (b) Consider the message bits m4 m3 m2 m1 = 1101. Encode it into hamming code to detect single error.[5M]

(OR)

3. (a)Express the function (xy+z)(y+xz) in canonical SOP and POS forms. [5M]
   (b) Perform the following operations using 2's complement [5M]
   i) 1001.11-1100.10 ii) 87-99

SECTION – II

4. (a) Simplify the following function using K-map [5M]
   $f(A,B,C,D,E)=\Sigma(3,6,7,8,10,12,14,17,19,20,21,24,25,27,28)$
   (b) A majority circuit is a combinational circuit whose output is equal to 1 if the input variableshave more 1's than 0's. The output is 0 otherwise. Design a three input majority circuit and implement it using NAND gates. [5M]

(OR)

5. (a) Implement the following Boolean function with a multiplexer. [5M]
   $F(A,B,C,D)=\sum(1, 3, 4, 11, 12, 13, 14,15)$
   (b) Simplify the following function using Quine-McCluskey method [5M]
   $F(w, x, y,z)= \Sigma_m (0,6,8,13,14) + \Sigma_\Phi(2,4,10)$

SECTION – III

6. (a) What is Race around condition and explain how it is eliminated in Master Slave D-flip flop. [6M]
   (b) Show that the characteristic equation of T flip is Q(t+1) = TQ'+T'Q [4M]

(OR)

7. (a) Construct a JK flip flop using a D flip flop and other logic gates. [5M]
   (b) Explain the operation of clocked JK flip flop with the help of timing diagrams. [5M]

SECTION – IV

8. (a) Design a synchronous counter using JK flipflops with the following repeated binary sequence 0,1,2,3,4,5,6. [5M]
   (b) Design a 4- bit universal shift register and explain its operation. [5M]

(OR)

9. (a) Draw and explain the logic diagram of 4-bit ring counter with the help of timing diagrams.[5M]

(b) A sequential circuit has two J-K flip-flops A and B and one input X. [5M]
The circuit is described by the following flip-flop input equations:

$J_A = X$ $K_A = B'$ $J_B = X$ $K_B = A$

Derive the state equations A(t+1) and B(t+1) and draw the state diagram of the circuit.

SECTION – V

10. (a) Find the equivalence partition for the machine shown in below table [3M]
    (b) Show the standard form of the corresponding reduced machine. [4M]
    (c) Find a minimum-length sequence that distinguishes state A from state B [3M]

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

(OR)

11. (a) What is merger table method? Explain with suitable example. [5M]
    (b) Write short notes on state equivalence and machine minimization. [5M]

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R17

Code No: R17A0407

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Regular Examinations, November 2018

SWITCHING THEORY AND LOGIC DESIGN

(EEE, ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1. a) Convert the number $(127.75)_8$ to base 10, base 3, base 16 and base 2. **[6+2+6=14M]**

b) Given that $(64)_{10} = (100)_b$, determine the value of b.

c) Perform the binary arithmetic operations on (+12)-(4) using signed 2'scomplement method.

OR

2. a) Write the procedure for constructing Hamming codes. Construct hamming codes for the 1011. **[6+4+4=14M]**

b) Justify the statement that "Gray code is a class of reflected code".

c) Realize the basic gates using NAND and NOR gates only.

SECTION-II

3. a) . Determine the canonical product-of-sums and sum-of-products form of **[6+8=14M]**

T = x'(y' + z')

b) For the given function T(W,X,Y,Z)=∑m(0,1,5,7,8,10,14,15)

i) Show the map ii) find all the prime implicants and indicate which are essential iii) Find minimal expression and realize using basic logic gates.

OR

4. a) Simplify the following function using K-map and implement using universal gates **[7+7=14M]**

F=A'BC'D'+A'BC'D+AB'CD+AB'CD+AB'CD'+ABCD+A'B'C'D'

b) Use tabular method and simplify the following functions

F=∑m(2,3,5,6,7,9,12,14,15)

SECTION-III

5. a) Design a combinational logic circuit with 4 inputs A,B,C,D. The output is HIGH if and only if A and C inputs go HIGH. Draw the truth table. Minimize the Boolean function using K-Map. Draw the circuit diagram. **[6+8=14M]**

b) Design full adder and Realize full adder using two adders and logic gates.

OR

6. **a)** Define magnitude comparator and Design a 2-bit comparator to compare two 2-bit numbers. **[8+6=14M]**

b) Design a circuit to convert Xs-3 code to BCD code.

SECTION-IV

7. **a)** Draw the logic diagram, truth table characteristic table and characteristic equation of an SR-latch. **[10+4=14M]**

b) Compare latch and flip-flop.

OR

8. **a)** Covert the following **[10+4=14M]**

i) JK flip-flop to T flip-flop ii) SR flip-flop to D flip-flop

b) Write the differences between combinational and sequential circuit.

SECTION-V

9. **a)** Design a clocked sequential circuit machine using D flip-flop for the state diagram. Use state reductions if possible make proper assignment. **[8+6=14M]**

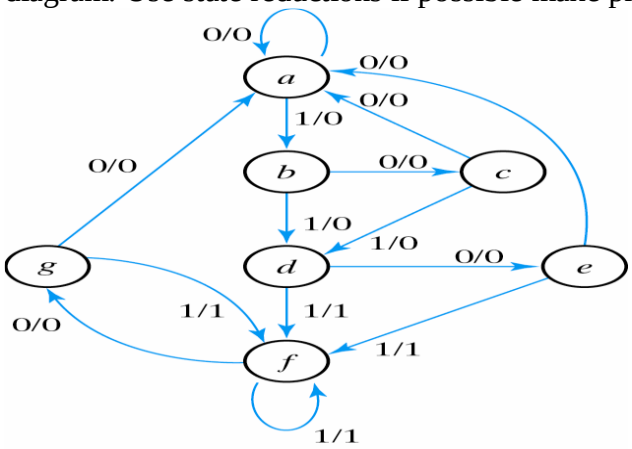

Fig. 5-22 State Diagram

b) Explain the following related to sequential circuits with suitable.

a) State diagram b) State Table c) State Assignment

OR

10. **a)** Design a Mod-6 synchronous counter using JK flip-flops. **[7+7=14M]**

b) What is meant by universal shift register and Design it.

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II B. Tech I Semester Regular Examinations, November 2018

SWITCHING THEORY AND LOGIC DESIGN

(EEE, ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1. a) Use 2's complement arithmetic to subtract **[6+4+4=14M]**
i) $(54)_{10}$ from $(231)_{10}$ ii) $(-27)_{10}$ - $(87)_{10}$

b) Define the terms i) Cyclic codes ii)Unit distance codes

c) Briefly explain about BCD code.

OR

2. a) A receiver has received a message code 1110110 which is an even parity Hamming code. Determine whether the message code has any error. If so correct the error. Give proper reasoning for your answer. **[10+4=14M]**

b) Explain the different logic gates in detail?

SECTION-II

3. a) State and Prove the Huntington postulates of Boolean algebra. **[7+7=14M]**

b) Find the complement of the function and represent in sum of minterms
F = xy + z'

c) Simplify the following function and realize using universal gates

F (A,B,C) = A'BC' + ABC + B'C' + A'B'

OR

4. a) Use tabular method and simplify the following functions **[7+7=14M]**
F=∑m(0,1,6,7,8,9,13,14,15)

b) What is importance of the Don't care conditions in K-map method.
F=∑m(0,1,3,8,6,7,14,15)+ d(5,11,13)

SECTION-III

5. a) Design a combinational circuit whose input is a 3 input binary number and whose output is a 2's complement of the input number. **[7+7=14M]**

b) Implement the following functions using multiplexer.

i)F1=∑m(2,3,6,8,12) ii) F2=∑m(1,3,5,6,7,8,10) iii)F3= ∑m(1,3,4,5,6,13,14)

OR

6. a) What is a Half Subtractor? Realise using universal gates.
b) Design 3 to 8 line decoder and explain the operation. **[5+5+4=14M]**
c) Implement full adder using 8:1 MUX.

SECTION-IV

7. a) What is race around condition? How it can be avoided? **[4+4+6=14M]**
b) Draw schematic circuit of master-slave JK flip-flop and explain its operation with the help of truth table.
c) Write the characteristic equations, excitation tables for JK, T, SR and D flip-flops.

OR

8. a) What is excitation table? Write the excitation tables for the following flip-flops. **[7+7=14M]**
i) SR flip-flop ii)JK flip-flop iii)T flip-flop
b) Convert D flip-flop to SR flip-flop.

SECTION-V

9. a) Analyse the following synchronous sequential circuit. **[10+4=14M]**

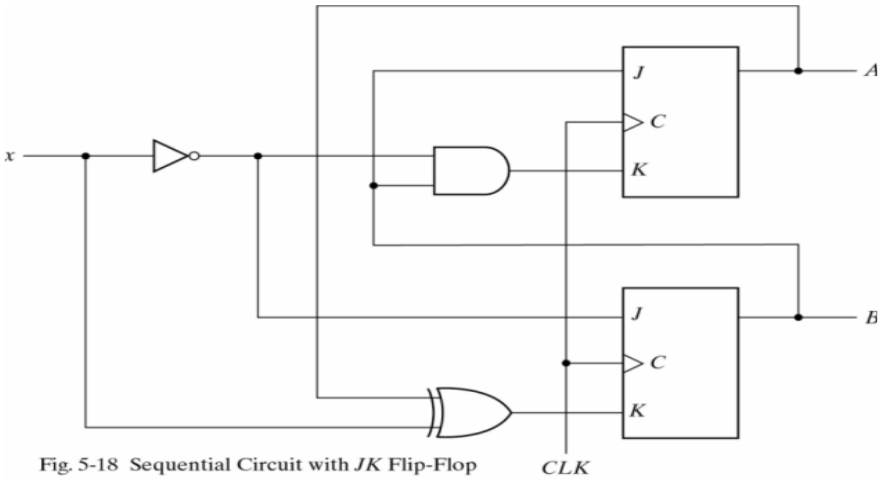

Fig. 5-18 Sequential Circuit with *JK* Flip-Flop

b) Compare mealy and moore machines.

OR

10. a) Design a modulo-12 up synchronous counter using T flip-flop and draw the circuit diagram. **[8+6=14M]**
b) Design and explain the operation of Bi-directional shift register.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Regular Examinations, November 2018

SWITCHING THEORY AND LOGIC DESIGN

(EEE, ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1. a) Convert the decimal number 234 to binary, octal and hexadecimal. **[4+6+6=14M]**

b) Obtain the 1's and 2's complement of the binary numbers.
i)1011011 ii)0110101 iii)10110 iv)001101100

c) Write Gray code for the following decimal numbers
i)1000 ii) 724 iii) 83

OR

2. a) Perform $(46)_{10}$ - $(22)_{10}$ in BCD using 10's complement. **[4+10=14M]**

b) Given the 8-bit data word 01011011, generate the 12-bit composite word for the hamming code that corrects and detects single error.

SECTION-II

3. a) Demonstrate by means of the truth tables the validity of the following theorems of Boolean algebra. **[9+5=14M]**
i)Commutative law ii)Distributive law iii)Demorgan's theorems

b) What do you mean by minterms and maxterms?

OR

4. a) Simplify the function $F=\Sigma m(0,1,2,8,9,10,11)+\Sigma d(14,15)$ using K-Map and implement using gates. **[7+3+4=14M]**

b) Simplify the given Boolean function to minimal number of literals
F=X+Y[Z+(X+Z)']

c) Define prime and essential prime implicants.

SECTION-III

5. a) Draw the block diagram of BCD adder using two 4-bit parallel adders and **[10+4=14M]**

b) logic gates.
Design a combinational circuit to find the 2's complement of a given 4-bit binary number and realize using NADN gates.

OR

6. a) Design a logic circuit to convert BCD to gray code. **[8+6=14M]**

b) Design a 3 to 8 decoder. Draw the circuit diagram, functional table and explain the working of the decoder circuit.

SECTION-IV

7. a) Draw the schematic circuit of JK flip-flop and explain its operation with the help of truth table. **[8+6=14M]**

b) Define the terms preset and clear in connection with flip-flop.

OR

8. a) Write the conversion procedures of the flip-flops. Convert T-flip-flop to JK-flip-flop. **[8+6=14M]**

b) Discus the applications of the flip-flops.

SECTION-V

9. a) Compare synchronous and asynchronous circuits. **[4+10=14M]**

b) A sequential circuit has two JK flip-flops A and B, two inputs x and y, and one output z

.The flip-flop input equations and circuit output equation are

JA=Bx+B'y' KA=B' xy'

JB=Ax'y' KB=A+xy'

Z=Ax'y'+Bxy'

i) Draw the logic diagram of the circuit.

ii) Derive the state equations for A and B

iii) Tabulate the state table

iv) Draw the state diagram.

OR

10. a) Define Counter and Design Decade synchronous counter using JK flip-flops. **[10+4=14M]**

b) Compare merits and demerits of ripple and synchronous counters.

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R15

Code No: R15A0407

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, April/May 2018

Switching Theory and Logic Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A **(25 Marks)**

1. (a) Find the dual of the function f= ab+b'c+a'b' 2M
   (b) Convert the following numbers into Decimal numbering system 3M
   i) $(135.4)_6$ ii) $(430.2)_4$
   (c) Explain about prime implicants and essential prime implicants of a function. 2M
   (d) Design a full adder logic circuit. 3M
   (e) What are the differences between combinational and sequential circuits. 2M
   (f) Discus about Race-around condition in J K Flip-Flop. 3M
   (g) What are the applications of Flip-Flops? 2M
   (h) Explain the difference between synchronous counter and Asynchronous counter 3M
   (i) What is a merger chart? 2M
   (j) Differentiate between moore and mealy FSMs. 3M

PART – B **(50 Marks)**

SECTION – I

2. (a) Perform the following operations using 2's complement 6M
   i) 1011.01-1001.11 ii) 100010-100011
   (b) Convert the following to the other canonical form 4M
   (i) $F(A,B,C,D) = \Sigma_m(1,3,5,6,11,13)$
   (ii) $F(A,B,C,D) = \pi(1,2,5,7,10,12)$

(OR)

3. (a) Simplify the Boolean expression A'C'+ABC+AC'+AB' and realize it using basic gates. 5M
   (b) What was the original 8 bit data word that was written into the memory if the 12 bit Hamming code word read out is "000011101010". 5M

SECTION – II

4. (a) Simplify the following function using K-map and implement using gates. 5M
   $f(w,x,y,z)=\Sigma(0,2,5,7,9,11,13,15)$
   (b) Draw and explain the logic diagram of 3 to 8 decoder. 5M

(OR)

5. (a) Simplify the following function using Quine-McCluskey method 5M
   $F(w, x, y,z)= \Sigma_m (4,5,6,7,12,13,14) + \Sigma_\Phi(1,9,11,15)$
   (b) Design a combinational circuit that converts four-bit Binary code to four-bit Gray code. 5M

SECTION – III

6. (a) What is Race around condition and explain how it is eliminated in Master Slave. 6M

   (b) Show that the characteristic equation of JK flip is Q(t+1) = JQ'+K'Q 4M

(OR)

7. (a) Construct a JK flip flop using a T flip flop and other logic gates. 5M

   (b) Explain the operation of clocked SR flip flop with the help of logic diagram. 5M

SECTION – IV

8. (a) Draw the logic diagram of a 4-bit bidirectional shift register and explain its working. 5M

   (b) Design a Modulo-7 binary synchronous counter using J K Flip-Flop. 5M

(OR)

9. (a) Reduce the following state table to a minimum number of states using state reduction 5M

Present state	Next state		Output (Z)	
	X=0	X=1	X=0	X=1
a	c	b	1	1
b	d	c	0	0
c	g	d	0	1
d	e	f	1	0
e	a	f	1	0
f	g	f	1	0
g	a	f	1	0

   (b) Draw and explain the logic diagram of 4 bit twisted ring counter with the help of timing diagrams. 5M

SECTION – V

10. (a) Discuss about capabilities and limitations of finite state machines. 5M

    (b) Write short notes on incompletely specified machines. 5M

(OR)

11. (a) Find the equivalence partition for the machine shown in below table 10M

    (b) Show the standard form of the corresponding reduced machine.

    (c) Find a minimum-length sequence that distinguishes state A from state B

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

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Code No: R15A0407

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, Nov/Dec 2018

Switching Theory and Logic Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART – A (25 Marks)

1. (a) Express the following numbers in decimal [2M]
   i) $(11010.0111)_2$ ii) $(FAFA.B)_{16}$
   (b) Find the complement of [3M]
   i) (x'+y'+z)(x'+y)(x+z) ii) (A'B+CD)E'
   (c) Discuss the advantages of priority encoder. [2M]
   (d) Design a full subtractor logic circuit. [3M]
   (e)Implement 8:1 MUX using 4:1 and 2:1 MUX. [2M]
   (f) Draw the logic diagram of SR flip flop. [3M]
   (g) Differentiate between latch and flip flop [2M]
   (h) Explain how a counter can be used as a frequency divider circuit. [3M]
   (i) What is distinguishable state ? [2M]
   (j) Differentiate between moore and mealy FSMs. [3M]

PART –B (50 Marks)

SECTION – I

2. (a)Simplify the Boolean expression xy'z+x'y'z+w'xy+wx'y+wxy and realize it using basic gates. [5M]
   (b) Consider the message bits m4 m3 m2 m1 = 1101. Encode it into hamming code to detect single error.[5M]

(OR)

3. (a)Express the function (xy+z)(y+xz) in canonical SOP and POS forms. [5M]
   (b) Perform the following operations using 2's complement [5M]
   i) 1001.11-1100.10 ii) 87-99

SECTION – II

4. (a) Simplify the following function using K-map [5M]
   $f(A,B,C,D,E)=\Sigma(3,6,7,8,10,12,14,17,19,20,21,24,25,27,28)$
   (b) A majority circuit is a combinational circuit whose output is equal to 1 if the input variableshave more 1's than 0's. The output is 0 otherwise. Design a three input majority circuit and implement it using NAND gates. [5M]

(OR)

5. (a) Implement the following Boolean function with a multiplexer. [5M]
   $F(A,B,C,D)=\sum(1, 3, 4, 11, 12, 13, 14,15)$
   (b) Simplify the following function using Quine-McCluskey method [5M]
   $F(w, x, y,z)= \Sigma_m (0,6,8,13,14) + \Sigma_\Phi(2,4,10)$

SECTION – III

6. (a) What is Race around condition and explain how it is eliminated in Master Slave D-flip flop. [6M]
   (b) Show that the characteristic equation of T flip is Q(t+1) = TQ'+T'Q [4M]

(OR)

7. (a) Construct a JK flip flop using a D flip flop and other logic gates. [5M]
   (b) Explain the operation of clocked JK flip flop with the help of timing diagrams. [5M]

SECTION – IV

8. (a) Design a synchronous counter using JK flipflops with the following repeated binary sequence 0,1,2,3,4,5,6. [5M]
   (b) Design a 4- bit universal shift register and explain its operation. [5M]

(OR)

9. (a) Draw and explain the logic diagram of 4-bit ring counter with the help of timing diagrams.[5M]

(b) A sequential circuit has two J-K flip-flops A and B and one input X. [5M]
The circuit is described by the following flip-flop input equations:

$J_A = X$ $K_A = B'$ $J_B = X$ $K_B = A$

Derive the state equations A(t+1) and B(t+1) and draw the state diagram of the circuit.

SECTION – V

10. (a) Find the equivalence partition for the machine shown in below table [3M]
    (b) Show the standard form of the corresponding reduced machine. [4M]
    (c) Find a minimum-length sequence that distinguishes state A from state B [3M]

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

(OR)

11. (a) What is merger table method? Explain with suitable example. [5M]
    (b) Write short notes on state equivalence and machine minimization. [5M]

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R15

Code No: R15A0407

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular Examinations, April/May 2017

Switching Theory and Logic Design

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A

1. (a). Express the following numbers in decimal 2M
   (i) $(10110.0101)_2$
   (ii) $(16.5)_{16}$
   (b). Write the following Boolean expression in Product-of-Sum form 3M
   $f = \bar{a}\,b + \bar{a}\,\bar{c} + abc$
   (c) Express the basic difference between decoder and encoder? 2M
   (d) What are prime and essential prime implicants? Justify with suitable example using K map. 3M
   (e) What is the basic architecture difference between combinational and sequential circuits? 2M
   (f) Sketch the logic diagram of RS flip flop? 3M
   (g) Write the difference between synchronous and asynchronous counter. 2M
   (h) Define state diagram and state table. 3M
   (i) What are the limitations of Finite State Machines (FSM)? 2M
   (j) What is the difference between Mealy and Moore machine? 3M

PART B

Section-I

2. (a) Implement the following function using NAND gates [5]
   $F = A(B + CD) + \overline{BC}$ ⇒ $AB + AcD + \bar{B} + \bar{C}$
   (b) Express the complement of the following function in sum-of-minterm form
   $F(x, y, z) = \prod(3,5,7)$. [5]

OR

3. (a) Let X=$(1010100)_2$ and Y=$(1000011)_2$
   Perform (i) X-Y, (ii) Y-X using 2'complement representation. [2]
   (b) Represent the decimal number 6248 in (i) BCD, (ii) binary, (iii) gray [4]
   (c) State and prove the following laws of Boolean algebra: (i) Commutative, (ii) Associative. [4]

Section-II

4. (a) Minimise the following function using K-map [5]
   $F(A,B,C,D) = \sum m(1,4,5,7,8,9,12,14) + d(0,3,6,10)$
   (b) Construct a 3x8 decoder using logic gates and truth table. [5]

OR

5. Design half adder & full adder circuit [10]

Section-III

[5+5]

6. Convert the following

(a) JK Flip flop to T-Flip flop
(b) RS Flip flop to D-Flip flop

OR

7. (a) What is race condition in JK-Flip flop ? Demonstrate how it can be avoided using Master-Slave Flip flop? [6]
(b) Draw a 4-bit Johnson's counter and explains its operation? [4]

OR

Section-IV

8. (a) For the following state Table-1

PS	NS		OUTPUT	
	x=0	x=1	x=0	x=1
A	A	B	0	0
B	C	D	0	0
C	A	D	0	0
D	E	F	0	1
E	A	F	0	1
F	G	F	0	1
G	A	F	0	1

Table 1

(i) Draw the corresponding state diagram [2]
(ii) Tabulate the reduced state table [6]
(iii) Draw the state diagram corresponding to the reduced state table [2]

OR

9. Design Mod 6 counter using J-K flip flop [10]

Section-V

10. Convert the following (see, Table 2) Mealy machine into corresponding Moore machine [10]

PS	NS	Z
	x=0	x=1
A	C,0	B,0
B	A,1	D,0
C	B,1	A,1
D	D,1	C,0

Table 2

OR

11. Draw the ASM chart for binary multiplier? [10]

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
MODEL QUESTION PAPER-1

Name of the Subject: MATHEMATICS - III
Time: 3 hours **Max Marks: 70**
Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1. Find the Fourier expansions of f(x) = xcosx; 0<x<2π. [14M]

OR

2. a) Find the Fourier series of periodicity of $f(x) = 2x - x^2$, $in\ 0 < x < 3$. [7M]

b) Expand the function f(x) = x as a Fourier series in (-π,π). [7M]

SECTION-II

3. Using Fourier integrals show that $e^{-ax} - e^{-bx} = \frac{2(b^2-a^2)}{\pi}\int_0^{\infty} \frac{\lambda \sin \lambda x}{(\lambda^2+a^2)(\lambda^2+b^2)} d\lambda,\ a>0, b>0$

OR

4. Find the finite Fourier sine and cosine transform of f(x), defined by f(x)=2x,where $0 < x < 2\pi$ [14M]

SECTION-III

5. Show That the function is defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at $z \neq 0$, and f(0) = 0 is continuous and satisfies C-R equations at the origin but $f'(0)$ does not exist. [14M]

OR

6. a. Evaluate $\oint \frac{z-1}{(z+1)^2(z-2)} dz\ where\ c: |z-i| = 2$ by Cauchy's Integral Formula. [7M]

b. Evaluate $\int_C \frac{z+4}{z^2+2z+5} dz,\ here\ c: |z+1-i| = 2.$ [7M]

SECTION-IV

7. a. Define (i) Removable singularity, (ii) Essential singularity, (iii) Pole Singularity. [6M]

b. Find the Laurent's Series of $(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region$3 < |z+2| < 5$. [8M]

OR

8. a. Evaluate by Residue Theorem $\int_C \frac{z-1}{(z+1)^2(z-2)}dz,\ here\ c: |z-i| = 2.$ [7M]

b. Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3Cos\theta}$ by Contour Integration. [7M]

SECTION-V

9. Find and plot the image of the regions (i) $x > 1$ (ii) $y > 0$ (iii) $0 < y < \frac{1}{2}$ [14M]

Under the transformation $= \frac{1}{z}$.

OR

10. a. Find the Fixed Points of the Transformation.

(i). $= \frac{z-6}{iz-3}$ (ii). $w = \frac{6z-9}{z}$ (iii). $= \frac{z-1}{z+1}$ (iv). $= \frac{2z-5}{z+4}$ [7M]

b. Define Bilinear Transformation and Show That Every Bilinear Transformation is Conformal. [7M]

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous Institution - UGC, Govt. of India)
MODEL QUESTION PAPER-2

Name of the Subject: MATHEMATICS – III
TIME: 3hours **Max. Marks: 70**
Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1. Find the half – range cosine series for the function $f(x)=(x-1)^2$ in the interval $0<x<1$ and Show that $\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}=\frac{\pi^2}{8}$ [14M]

OR

2. Expand $f(x)=e^x, -\pi<x<\pi$ as a Fourier series. Derive a series for $\frac{\pi}{sinh\pi}$ [14M]

SECTION-II

3. Find the Fourier sine transform of $\frac{x}{a^2+x^2}$ and Fourier cosine transform of $\frac{1}{a^2+x^2}$ [14M]

OR

4. Find Fourier sine and cosine transforms $f(x)=\frac{e^{-ax}}{x}$ and deduce that [14M]
$$\int_0^{\infty}\frac{e^{-ax}-e^{-bx}}{x}\sin sx\,dx=\tan^{-1}\left(\frac{s}{a}\right)^x-\tan^{-1}\left(\frac{s}{b}\right)$$

SECTION-III

5. a. Evaluate $\int_C \frac{z+4}{z^2+2z+5}dz,\ here\ c: |z+1-i|=2.$ [7M]

b. Find the analytic function whose real part is $e^2(xCos2y-ySin2y)$. [7M]

OR

6. State and Prove Cauchy's Integral Formula. [14M]

SECTION-IV

7. a. Find the Laurent's Series of $\frac{1}{z^2-4z+3}$ for $1<|z|<3$. [7M]

b. Find the Taylor's Series of e^z about z = 3. [7M]

OR

8. Evaluate $\int_C \frac{z-3}{z^2+2z+5}dz$, where c is the Circle given by [14M]
(i). $|z|=1$, (ii). $|z+1-i|=2$, (iii). $|z+1+i|=2$

SECTION-V

9. a. Find the Bilinear Transformation which maps the points (0, 1, i) into the points (1+i, -i, 2-i). [10M]

b. Write Cross-Ratio of four points z_1, z_2, z_3, z_4. [4M]

OR

10. a. Show that the function $w = \frac{4}{z}$ transforms the straight line x = c in the z – plane into a circle in the w-plane [10M]

b. Define Critical Point and Bilinear Transformation [4M]

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MODEL QUESTION PAPER-3

Name of the Subject: MATHEMATICS - III
Time: 3 hours **Max Marks: 70**
Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1. Find the Fourier series of period 2π for the function $f(x) = x^2 - x \ in \ (-\pi, \pi)$.
Hence deduce the sum of the series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} - - - = \frac{\pi^2}{6}$ [14M]

OR

2.a) Obtain sine series for $f(x) = \pi x - x^2$, in 0<x< π. [7M]

b). Obtain fourier series for the function $(x) = xsinx$ in $(-\pi, \pi)$ [7M]

SECTION-II

3. Using Fourier Integral, show that $\int_0^{\infty} \frac{1-\cos\lambda\pi}{\lambda} \sin\lambda x \, d\lambda = \begin{cases} \frac{2}{\pi}, & if \ 0 < x < \pi \\ 0, & if \ x > \pi \end{cases}$ [14M]

OR

4. Find the Fourier transform of f(x) = $\begin{cases} a^2 - x^2, if \ |x| < a \\ 0, if \ |x| > a > 0 \end{cases}$ Hence show that $\int_0^{\infty} \frac{sinx - cosx}{x^3} dx = \frac{\pi}{4}$ [14M]

SECTION-III

5 a. Find analytical function whose real part is $r^2 Cos2\theta + rSin2\theta$. [7M]

b. If f (z) is an analytic function of z, prove that $(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}) |f(z)|^2 = 4|f^1(z)|^2$. [7M]

OR

6 a. Evaluate $\int_C \frac{z^2 - z + 1}{z - 1} dz, \ where \ c: |z| = \frac{1}{2}$. [7M]

b. Evaluate $\int_C \frac{logz}{(z-1)^3} dz, \ where \ c: |z - 1| = \frac{1}{2}$ using Cauchy's Integral Formula. [7M]

SECTION-IV

7. a. Expand $\frac{7z-2}{(z+1)(z-2)}$ about the point z = -1 in the region $1 < |z+1| < 3$ as Laurent's Series [7M]

b. Expand f(z) = Cosz in Taylor's Series about $z = \frac{\pi}{4}$ [7M]

OR

8. a. State and Prove Cauchy's Residue Theorem [7M]

b. Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(1+x^2)(x^2+4)}\, dx.$ [7M]

SECTION-V

9. a. Show that the function $w = \frac{4}{z}$ Transforms the line x = c in the z- plane into a Circle in the w- plane. [7M]

b. Under the Transformation $w = \frac{z-i}{1-iz}$ find the image of the Circle

(i). $|w| = 1$, (ii). $|z| = 1$. [7M]

OR

10. Find the Bilinear Transformation which maps 1 + i, - i, 2 - i of the z- plane into the points 0, 1, i respectively of the w-plane. Find the Fixed and Critical Points of this Transformation. [14M]

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MODEL QUESTION PAPER-3

Name of the Subject: MATHEMATICS - III
Time: 3 hours **Max Marks: 70**
Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

SECTION-I

1.

Section-III

Q. No.5. a. Find the analytic function whose real part is $e^2(xCos2y - ySin2y)$. [7M]

b. Show That $(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane. [7M]

OR

Q. No.6. a. State and Prove Cauchy's Integral Theorem. [7M]

b. Evaluate $\int_0^{1+}[x^2 + 2xy + i(y^2 - x)]dz\ along\ y = x^2$ [7M]

Section-IV

Q. No. 7. a. Find the Laurent's Series of $\frac{1}{z^2-4z+3}$ for $1 < |z| < 3$. [7M]

b. Find the Taylor's Series of e^z about z = 3. [7M]

OR

Q. No.8. a. Find the Residue at z = 0 of the function $(z) = \frac{1+e^z}{Sinz+zCosz}$. [7M]

b. Evaluate $\int_C \frac{z-3}{z^2+2z+5}dz$, where c is the Circle given by

(i). $|z| = 1$, (ii). $|z + 1 - i| = 2$, (iii). $|z + 1 + i| = 2$. [7M]

Section-V

Q. No. 9. a. Find the image of $|z| = 2$ under the transformation w = 3z. [7M]

b. Under the Transformation $w = \frac{1}{z}$ find the image of the Circle $|z - 2i| = 2$. [7M]

OR

Q. No. 10. Find the Bilinear Transformation that maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$. [14M]