

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2018**Subject: LINEAR AND DIGITAL IC APPLICATIONS****Branch: Common to EEE & ECE****Time: 3 hours****Max. Marks: 75****I. Answer all questions**

5x1M=5 Marks

1. Mention the characteristics of an ideal operational amplifier.
2. Draw the circuit diagram of a non-inverting amplifier with feedback.
3. Why active filters are preferred over passive filters.
4. Define load regulation.
5. Define fan-in and fan-out.

II .Answer all questions

10x2M=20 Marks

1. Explain briefly about DC Characteristics of Op-Amp.
2. Draw the pin diagram and symbol of Op-Amp.
3. What is voltage follower?
4. Differentiate between a basic comparator and a Schmitt trigger.
5. What is all pass filters? Why do we need it?
6. List any two features and applications of 555 timer.
7. Discuss the limitations of linear voltage regulators.
8. Compare R-2R ladder and weight resistor type of ADC.
9. Explain how MOS transistor works as switch.
10. Write the applications of shift registers.

PART- B

5X10M=50 Marks

Answer all questions**ALL Questions carries equal marks****Q1.** What is differential amplifier? Explain the operation with relevant circuit diagrams.**(OR)****Q2.** Explain the modes of operation of Op-Amp.**Q3. (a)** Explain the application of op-amp as an adder and an subtractor. (5 Marks)

(b) Apply the input offset voltage of an OPAMP is 10mV dc. For a non Inverting amplifier with $R_f = 10k$ and $R = 1k$. What is the maximum possible output offset voltage? (5 Marks)

(OR)

Q4. (a) Explain the operation of Schmitt trigger with relevant circuit diagram and waveforms.

(5 Marks)

(b) Design a Schmitt trigger with the upper threshold level $V_{UT} = 0V$ and hysteresis width $V_H = 0.2V$ converts a 1 KHz sine wave of amplitude $4V_{pp}$ into a square wave.

(5 Marks)

Q5. (a) Explain the operation of the first order high pass Butterworth filter with neat circuit diagram.

(5 Marks)

(b) An ideal low pass filter having $f_H = 5$ KHz is cascaded with high pass filter having $f_L = 4.8$ KHz. Sketch the frequency response of the cascaded filter.

(5 Marks)

(OR)

Q6. (a) Explain frequency translation and FSK demodulation using PLL.

(5 Marks)

(b) An Astable 555 Oscillator is constructed using the following components, $R_1 = 1k\Omega$, $R_2 = 2k\Omega$ and capacitor $C = 10\mu F$. Calculate the output frequency from the 555 oscillator and the duty cycle of the output waveform.

(5 Marks)

Q7. (a) Explain the characteristics of three terminal IC regulators.

(5 Marks)

(b) Evaluate the 7805 IC voltage regulator; design a current source that will deliver a 0.25A current to a 48Ω , 10W load.

(5 Marks)

(OR)

Q8. With the help of a neat circuit diagram and waveforms, explain the operation of a dual slope ADC. What are its special features?

(5 Marks)

Q9. (a) Design a 32 to 1 multiplexer using four IC 74151 multiplexers and IC74138 decoder.

(5 Marks)

(b) Realize the following expression using 74×151 IC: $f(Y) = AB + BC + AC$

(5 Marks)

(OR)

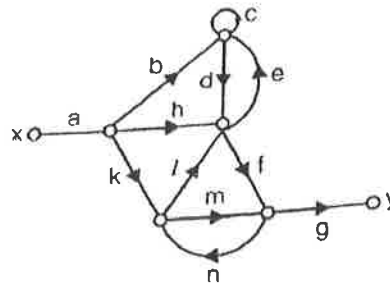
Q10. Design and realize an asynchronous decade counter.

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1. Write the equivalent elements of mechanical rotational system using Force-Current Analogy.
2. Differentiate between steady-state and transient response.
3. What is the effect of adding zeros to the transfer function $G(s)H(s)$ on the root locus?
4. What is meant by resonant frequency?
5. Define controllability.

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Differentiate between open loop and closed loop control systems.
2. The signal flow graph of the figure shown below has -----forward paths and -----feedback loops.



3. What does it mean by steady-state error? Derive the expression for e_{ss} .
4. Explain the significance of P, I and D Controllers.
5. The characteristic equation for feedback control system is given as $s^3 + 2Ks^2 + (K + 2)s + 4 = 0$.

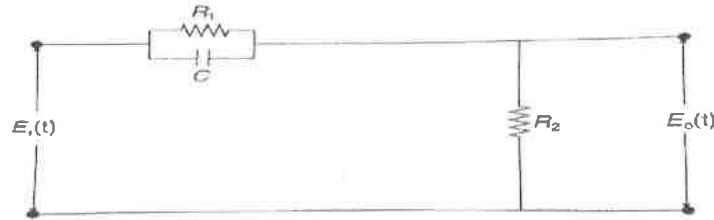
Determine the ranges of values of K for the system to be stable.

6. List out the advantages of root locus.
7. The Nyquist plot of open loop transfer function $G(S)H(S)$ of a closed loop control system passes through the point $(-1, j0)$ in the $G(S)H(S)$ plane. What is the gain margin and phase margin?
8. What are lead, lag compensators? When they are preferred?
9. What is the transfer function for the state variable representation?

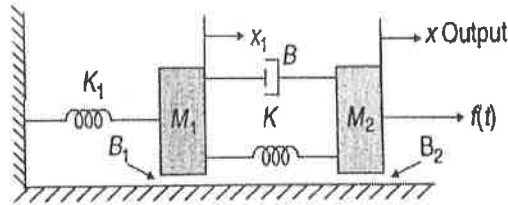
$$\dot{X} = AX + BU, Y = CX + DU$$

10. What are the properties of a state transition matrix?

1. (a) For the given network, obtain its transfer function.

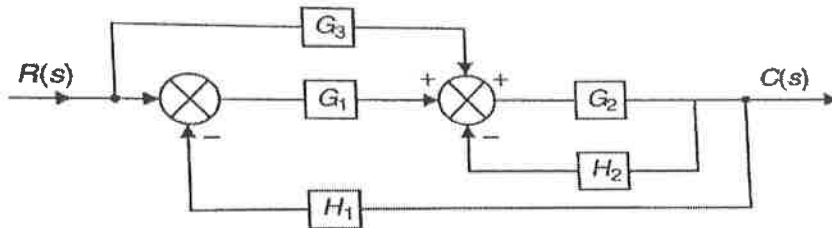


- (b) Determine the transfer function $F(s)/X(s)$ for the system shown as below.

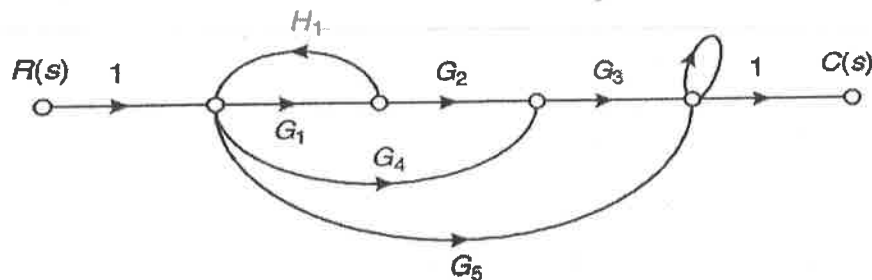


(OR)

2. (a) Determine the transfer function for the given system.



- (b) Using Mason's gain formula, obtain the transfer function for the given signal flow graph.



3. A unity feedback control system is characterized by the following open-loop transfer function,

$$G(s) = \frac{0.4s+1}{s(s+0.6)}$$
 Determine its transient response for a unit-step input. Evaluate the maximum overshoot and the corresponding peak time.

(OR)

4. A unity feedback system is characterized by the open loop transfer function

$$G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$$

Determine the steady state errors for unit step, unit ramp and unit acceleration inputs. Also determine the damping ratio and natural frequency of the dominant roots.

5(a). What is meant by stability? State the limitations of Routh's stability.

(b). By means of Routh criterion, determine the stability of the system represented by the following characteristic equation. If the system is found to be unstable, determine the number of roots in the right half of s-plane.

$$s^5 + s^4 + 3s^3 + 9s^2 + 16s + 10 = 0$$

(OR)

6. (a) Sketch the root locus for the control system whose open loop transfer function is $G(s)H(s) = \frac{Ke^{-s}}{s(s+2)}$

Find the range of K for under damped and critical damped response.

7. The open loop transfer function of a system is given by $G(s) = \frac{K}{s(1+0.1s)(1+0.5s)}$.

Using bode plot find the value of K so that i) the gain margin is 10 db ii) phase margin is 35°.

(OR)

8. Sketch the Nyquist plot for the open loop transfer function $G(s) = \frac{K}{s(s+1)(s+20)}$ and determine the value of K for the closed loop system to be stable.

9. (a) For the system having the transfer function, obtain the state model.

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 2s + 4}{s^3 + 9s^2 + 26s + 24}$$

(b) For the state model obtained in the above problem, test whether the system is state controllable and state observable or not.

(OR)

10. (a) Determine the state transition matrix for the system described by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

(b) Find the solution of the homogeneous state equation:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \text{ with } x_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2018Subject: Analog Communications

Branch: ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. Write AM equation
2. What is bandwidth of DSB-SC system?
3. What is the difference between phase and frequency modulation?
4. What is the SNR in DSB – SC system?
5. Draw PPM signal.

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. If a carrier of 100 % modulated AM wave is suppressed, what is the percentage of power saving?
2. What is the disadvantage of over modulation?
3. Why two stages are used in frequency discrimination method of SSB generation?
4. What are advantages of VSB system?
5. Write the FM equation.
6. What is Carson's rule?
7. What is the use of Pre-emphasis circuit?
8. What is the difference between noise factor and noise figure? How do you estimate noise figure from noise factor?
9. What are the advantages of VSB system?
10. What are the applications of Pulse modulation?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. a) Explain necessary expressions, waveforms and spectrums, Explain AM for an arbitrary baseband signal $m(t)$.
b) The output power of an AM transmitter is 1KW when sinusoidally modulated to a depth of 100%. Calculate the power in each side band when the modulation depth is reduced by 50%.

(OR)

2. a) Sketch the one cycle of AM wave and calculate the modulation index of it in terms of V_{max} and V_{min} voltages.

b) A modulating signal consists of a symmetrical triangular wave having zero dc component and peak to peak voltage of 12V. It is used to amplitude modulate a carrier of peak voltage 10V. Calculate the modulation index and the ratio of the side lengths L_1/L_2 of the corresponding trapezoidal pattern.

3. a) Explain the Third method of generating SSB modulated waves.

b) Explain the coherent detection of SSB signals.

(OR)

4. Calculate the filter requirement to convert DSB signal to SSB Signal, given that the two side bands are separated by 200HZ. The suppressed carrier is 29MHZ.

5. a) Describe generation of FM carrier by Transistor reactance modulator with necessary diagrams.

b) Compare the phasor diagram of narrow band FM signal and AM signal and discuss about the similarities and differences of the two signals

(OR)

6. a) Why are limiters and preemphasis filters used in FM radio.

b) Classify radio transmitters based on the type of modulation and Service involved.

7. Derive the expression for figure of merit of AM system for large case.

(OR)

8. a) Explain the equivalent model of a generalized communication system for noise calculation.

b) Explain the noise performance of DSB -SC scheme with the help of block diagram

9. a) Explain the purpose and working of Tracking circuits.

b) Explain the purpose of pre emphasis and de emphasis circuits and the working of these circuits.

(OR)

10 a) Discuss about the alignment of Radio receiver with all details.

b) Discuss about the need for limiter and de-emphasis circuits in FM receivers

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Branch: ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following**

5x1Mark=5 Marks

1. What is inelastic demand?
2. What is meant by laws of returns?
3. What to do mean by market skimming?
4. Define partnership.
5. Identify different types of activity ratios.

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. What is meant by elasticity of Demand? Give an example.
2. List out Determinants of demand
3. Define Isocost.
4. Elucidate External economies of scale
5. Define Monopolistic marketing with suitable example
6. Give the methods of pricing in Present economic Market
7. Name the Types of capital methods
8. Discuss the Working capital requirements
9. What is meant by Double Entry Method?
10. Explain Trail Balance.

PART-B**Answer ALL questions of the following**

5x10 Marks= 50Marks

1. Explain demand analysis with demand determinants, law of demand and its exceptions.

(OR)

2. How important is managerial economics in decision making?

3. What is the role of internal and external economies of scale in production?

(OR)

4. Explain:

- a. Cobb-Douglas Production Function
- b. Break-even analysis

5. Discuss pricing methods.

(OR)

6. Explain various competition methods in economic environment with examples.

7. A project requires an investment of Rs.11,11,111 and is expected to generate cash inflows of Rs.3,33,333, Rs.4,44,444, Rs.5,55,555 Rs.4,44,444 and Rs.3,33,333 for the next 5 years. The Risk free cost of capital is 11%. Evaluate the project by using IRR Method with the help of 25% and 26% D.f. If a Risk premium of 9% is considered, how do you evaluate the project and do you observe any change in your earlier decision?

Compute (i) Fake Pay-back period and(ii) IRR with the help of 25% and 26% D.f.

(OR)

8. Do you advocate continuation of LPG policies by the Government of India?

9. What are the different methods of preparing trial balance.

(OR)

10. Illustrate the significance of profit and loss account.

