Code No.: **30412/40412**

MR13/ MR14

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, DECMBER-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 Rf= 10k and R= 1 k. 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 VUT= 0V and hysteresis width VH=0.2V converts a 1 KHz sine wave of amplitude 4Vpp into a square wave. (5 Marks)

Q5. (a) Explain the operation of the first order high pass Butterworth filer 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, R1 = 1kΩ, R2 = 2kΩ and capacitor C = 10uF. 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 48 Ω, 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.

Code No.: **30211/40211**

MR13 & MR14

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018

Subject: **Control Systems**

Branch: **Common to EEE & ECE**

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

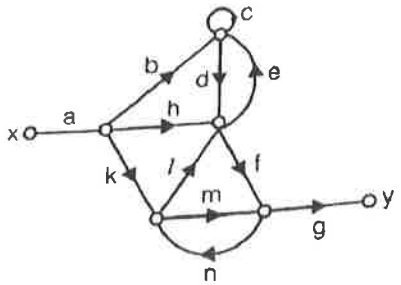
PART – A

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

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.

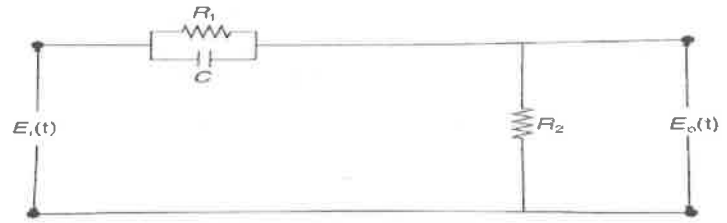


3. What does it mean by steady-state error? Derive the expression for e_{ss}.
4. Explain the significance of P, I and D Controllers.
5. The characteristic equation for feedback control system is given as $s^3 + 2Ks^2 + (K+2)s + 4 = 0$. Determine the ranges of values of K for the system to be stable.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

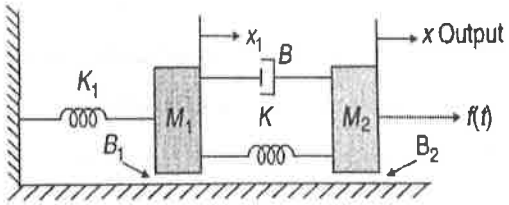
PART-B

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

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

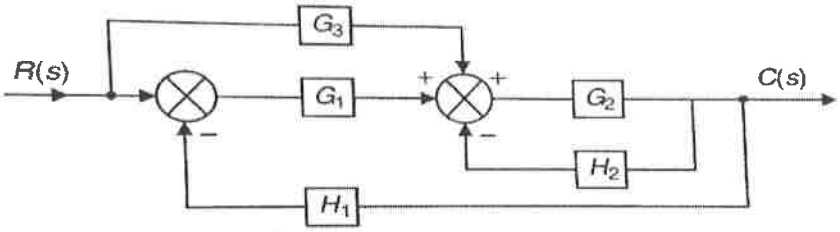


(b) Determine the transfer function $F(s)/X(s)$ for the system shown as below.

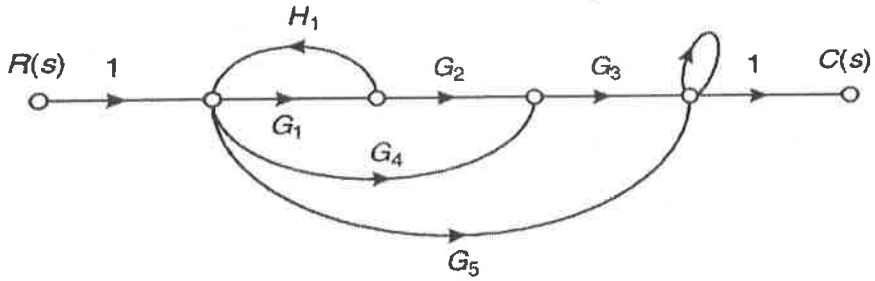


(OR)

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, $G(s)=\dfrac{0.4s+1}{s(s+0.6)}$. 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 lop 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:

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

Code No.: **30213/40213**

MR13/ MR14

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2018

Subject: **ELECTRICAL MACHINES-III**

Branch: **EEE**

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

PART – A

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

1. Write the formulae for distribution factors of synchronous machine.
2. The short circuit current at 1000 rpm is 20A, the short circuit current at 900 rpm, for the same excitation will be?
3. Which type of voltage regulation method gives voltage regulation nearer to actual value?
4. What is synchronous condenser?
5. State different methods for starting of 3- phase synchronous motor.

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

1. Write the differences between salient pole and wound rotor synchronous generator.
2. In a 3-phase, 4-pole, 50 Hz synchronous motor, the frequency, the number of poles and load torque all are halved. Then the motor speed will be.
3. In a 3 - ϕ star connected generator, if the fundamental and third harmonic rms voltage in each phase are respectively V_1 and V_3, then what is the line voltage of the generator?
4. Draw the load characteristics of synchronous generator.
5. Why synchronous impedance method is pessimistic method? Explain.
6. The results of slip test for star connected, salient pole alternator are given below.
   Phase value: $v_{max} = 108v$; $v_{min} = 96v$; $I_{max} = 12A$; $I_{min} = 10A$ then determine the direct axis (x_d) and quadrature axis (x_q) reactances.
7. What is synchronizing power? Explain its significance in parallel operation of alternators.
8. Write equations for power flow in synchronous motor.
9. State the applications of power diagrams.
10. What is hunting? How hunting can be eliminated in synchronous machine.

PART-B

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

1. Explain the operating principle of synchronous generator with its internal diagram.

OR

2. For a 3 – phase stator winding of a synchronous machine having 5 slots per pole per phase and coil span of 12 slot pitches. Then determine the value of pitch factor.
3. What is harmonic? How harmonics can be eliminated in armature side and field side of synchronous machine?

OR

4. What is armature reaction? Explain the armature in synchronous generator elaborately.
5. Derive the power equation of salient pole synchronous generator.

OR

6. Discuss the procedure to obtain voltage regulation by using MMF method.
7. Explain the conditions for parallel operation of alternator clearly with diagrams.

OR

8. What is V & Inverted V curve? Explain the operation of synchronous motor with variation of current & power factor with excitation.
9. Explain excitation and power diagrams elaborately.

OR

10. What is reluctance? Explain the working principle of reluctance motor.

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MR13/ MR14

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2018

Subject: **POWER ELECTRONICS**

Branch: **EEE**

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

PART – A

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

1. Define latching current.
2. What is phase control technique?
3. Define Dual Converter.
4. What kind of commutation is required for step-up cyclo-converter?
5. Write the application of inverter.

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

1. Sketch the V-I characteristics of IGBT and mark the region in which the device is operated as switch.
2. Define the ratings of SCR (i) Average ON state current (ii) Forward break over voltage.
3. What is the effect of connecting freewheeling diode across R-L load in controlled rectifiers?
4. How power flow can be controlled in a single phase fully controlled converter between source and load for R load and RL load?
5. What are the applications of dual converters?
6. What is the effect of source inductance on the converter performance?
7. What are the applications of Cyclo converters?
8. What is the difference single phase ac voltage controller and single phase cyclo-converter?
9. What are the different kinds of power losses in Choppers?
10. Draw the circuit diagram of parallel inverter.

PART-B

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

1. a). Discuss the need for parallel connections of SCRs with necessary diagrams.

   b). Discuss various protections circuits of a thyristor.

(OR)

2. Explain the operation of IGBT with VI and switching characteristics.

3. a) Explain the operation of a single phase half controlled bridge rectifier with R-L-E load. Derive the expression for (i) Average output voltage (ii) Rms value of output voltage.

b). A fully controlled rectifier is used to charge a 115V battery. The battery is already charged to 60 V. The source voltage of bridge is 230 V at 50 Hz. Find the range of firing angle possible.

(OR)

4. a) Explain the operation of single phase fully controlled converter with RL load. Derive the output voltage and current expressions for firing angle of 45 degrees.

b) A single phase fully rectifier is used to supply power to load having impedance 200 ohms and 150 mH, from 230V, 50Hz, ac supply at a firing angle of 90 degrees. Calculate (i) Average values of output voltage and current (ii) RMS values of output voltage and current.

5. Explain the operation of 3- phase half-wave converter for resistive load with necessary waveform and circuit diagram.

(OR)

6. Sketch output wave form for a 3-phase semi converter for a firing angle delay of 75°. Indicate the conduction of various elements and discuss whether freewheeling diode comes in to place on the assumption of continuous load current. Hence obtain an expression for an average output voltage.

7. A single phase full wave ac voltage controller controls load power. The input is 230V, 50 Hz. The load circuit consists of R= 3 Ω and $\omega_L = 4\Omega$. Determine

(i) The control range of firing angle

(ii) Maximum value of RMS load current

(iii) Maximum power

(iv) Power factor

(OR)

8. a) Explain the operation of a single phase mid-point step up cyclo converter with the help of circuit diagram and waveforms

b). Explain the operation of a single phase bridge type step down cyclo converter with the help of circuit diagram and waveforms

9. Write short notes on i) Jones chopper and ii) current limit control of dc-dc converter.

(OR)

10. Discuss various voltage control techniques employed in inverter circuits.

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018

Subject: **Power Systems - II**

Branch: **EEE**

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

PART – A

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

1. What is the GMR of a bundled conductor of two conductors separated by 10cm.
2. What is electrical length of the line?
3. List out various Power system Transients.
4. What is Ferranti effect?
5. What are Stringing chart?

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

1. Explain the Concept of GMR and GMD in line parameter calculations.
2. What is transposition of overhead lines? Explain the necessity of transposition.
3. Briefly explain about transmission line classification.
4. Explain the reason for assuming lumped parameters in short and medium transmission lines.
5. Define attenuation, distortion, reflection and refraction coefficients.
6. What is Surge Impedance of a Transmission line? Give the typical values for overhead lines and underground cables.
7. What is skin effect? Why is it absent in the D.C system?
8. Explain the effects of corona formation on overhead lines.
9. Explain about various insulating materials used in cables.
10. What is voltage stress in insulation of a cable? Derive the necessary expression for it.

PART-B

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

1. Derive the expression for the inductance per phase of a 3-phase overhead line with equilateral spacing.

(OR)

2. Determine the capacitance and charging current per unit length of a 3-phase overhead lines whose conductors are arranged in a horizontal plane with 3.0m distance between adjacent conductors.

3. A 3-phase, 50 Hz transmission line has resistance, inductance and capacitance per phase of 10 ohm, 0.1 H and 0.9μF respectively and delivers a load of 35 MW at 132 KV and 0.8 p.f. lag. Determine the efficiency and regulation of the line using nominal-T and nominal-π methods. Compare the results obtained.

(OR)

4. Derive the expression for voltage and current through rigorous solution, of a long transmission line and give the interpretation of these line equations.

5. A 500KV surge travels on an overhead line of surge impedance 400Ω towards its junction with a cable which has a surge impedance of 40 Ω. Find (i) transmitted voltage (ii) transmitted current (iii) reflected voltage (iv) reflected current.

(OR)

6. What is lattice diagram? Explain the procedure for building lattice diagram for surge impending short circuited line.

7. Explain corona phenomenon. Give corona loss formula and explain the factors effecting it.

(OR)

8. Define string efficiency. Explain capacitance grading method to improve string efficiency.

9. Derive expressions for sag and tension in a power conductor strung between two supports at equal heights taking into account the wind and ice loadings also.

(OR)

10 A single core cable has an inner diameter of 6cm and core diameter of 2cm. Its paper dielectric has a working maximum dielectric stress of 60kV/cm. Calculate the maximum permissible line voltage when such cables are used on a 3-phase power system.

Code No.: **40209** | **MR14**

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018

Subject: **Electrical And Electronics Instrumentation**

Branch: **EEE**

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

PART – A

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

1. List out the methods of measurements.
2. Expand the terms PMMC, PMMI instruments.
3. List out the types of instrument transformers.
4. List out the Advantages of Bridges.
5. Significance of calibration.

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

1. Illustrate the classification of measuring instruments.
2. List out the types of errors.
3. List out the different types of PMMC instruments.
4. List out the four differences between analog and digital instruments.
5. Applications of LVDT.
6. What is Phantom load.
7. Classify the DC bridges.
8. Draw Schering bridge to measure the capacitance.
9. List out the advantages of extension range of meters.
10. Draw the connection diagram for voltmeter extension.

PART-B

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

1. a) Explain the following terms related to Static Characteristics
   i) Accuracy
   ii) Precision

b) Explain the following terms related to Dynamic Characteristics
   i) Speed of response
   ii) Time constant
   iii) settling or response time

(OR)

2. a) Explain about following different types of errors
   i) Gross Error 3M
   ii) Systematic Error 3M

b) Explain the significance of dB Scale to draw the magnitude plot to find stability. 4M

3. Explain the construction, working and operation of PMMC instrument with neat sketch.

(OR)

4. Explain the

i) Display concepts in digital instruments

ii) Analog to digital conversion principle

5. Explain the working and operation of current transformer with suitable connection diagram and derive the CT ratio. 2M+2M+3M+3M

(OR)

6. a) Explain the construction and working of 1-Phase energy meter. 2.5M+2.5M

b) How 1-phase power will measure using energy meter with suitable connection diagram. 5M

7. Explain the construction, working, operation of Kelvin's Double Bridge with suitable diagram.

(OR)

8. Explain the bridge balancing, equivalent circuit of capacitance to find the dissipation factor.

9. Explain the calibration and standardisation of current and voltage analog measurement instruments.

(OR)

10 Explain the construction of shunts and shunts for AC instruments.