Code No.: 30213/40213 | 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, JUNE-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 advantages and disadvantages of short pitched winding.
2. What is synchronous impedance?
3. What is voltage regulation? State its significance.
4. Infinite Bus Bar means?
5. State the applications of Universal motor.

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

1. Why integral and fractional slot windings are used in synchronous generator?
2. A 8 pole, 25 Hz synchronous generator is directly coupled to and is driven by 50 Hz synchronous motor. What is the number of poles for the synchronous motor?
3. Draw the Z.P.F. characteristics of synchronous generator.
4. What is leakage reactance? State its significance.
5. What is two reaction theory? Who proposed it?
6. What is synchronous impedance? Write its formula in terms O.C. voltage & S.C current..
7. Define sub transient and transient reactance. Write its increasing order.
8. Draw phasor diagram of synchronous motor..
9. Write the advantages of permanent magnet synchronous motors.
10. What is damper winding? State its functions in synchronous generators and synchronous motors.

PART-B

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

1. Derive the EMF equation of synchronous generator in terms of pitch factor & distribution factor.

OR

2. Explain the different types armature windings employed in synchronous generator to eliminate hormonics
3. What is residual voltage? Draw OCC and SCC characteristics of synchronous generator with suitable diagram

OR

4. Draw the complete phasor diagram of synchronous generator.
5. Explain zero power factor method to obtain voltage regulation

OR

6. An alternator has X_d of 0.8 p.u and X_q of 0.6 p.u . It is used to supply full load at rated voltage at 0.8 power factor lag, find (i) the total induced emf on open circuit
   (ii) the voltage regulation
7. Explain the effect of change in excitation and mechanical input if two alternators are connected in parallel

OR

8. Why 3-phase synchronous motors are not self starting? Explain with working principle
9. Discuss application of power diagram

OR

10. Explain working principle of AC series motor and mention applications.

Code No.: **30412/40412** **MR13 / MR14**

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

Subject: **Linear and Digital Ic Applications**

Branch: **Common to EEE & ECE**

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

PART – A

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

1. Define input offset voltage.
2. What is an instrumentation amplifier?
3. List the advantages of passive filters.
4. Define line regulation.
5. Draw basic CMOS inverter circuit diagram.

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

1. Explain briefly about AC Characteristics of op-amp.
2. Define Operational Amplifier. Draw internal block diagram of Operational Amplifier
3. Compare integrator and differentiator.
4. Draw the circuit diagram of inverting and non-inverting amplifier with feedback.
5. Why do we use higher order filters? Give any two reasons.
6. What is the operating principle of PLL?
7. What is an switching regulator?
8. Define the following terms as related to DAC: (i) Linearity (ii) Resolution.
9. Explain why NMOS transistor produces weak '1' and PMOS transistor produces weak '0'?
10. Convert RS Flip-Flop to JK Flip-Flop.

PART-B

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

Q1. (a) What is an ideal Op-Amp? List the characteristics of it. (4 Marks)
(b) Explain the equivalent circuit of an op-amp. What is ideal voltage transfer curve? (6 Marks)

(OR)

Q2. Explain the operation of Dual input, balanced output differential amplifier. Determine the differential resistance and output resistance it.

Q3. (a) Explain the operation of inverting amplifier. (4 Marks)
(b) Design an inverting amplifier with a gain of -5 and an input resistance of 10kΩ. (6 Marks)

(OR)

Q4. (a) What is a sample and hold circuit. Explain its operation with relevant circuit diagrams and waveforms. (5 Marks)
(b) Find R_1 and R_f in the lossy integrator so that the peak gain is 20 dB and the gain is 3dB down From its peak when = 10000 rad/sec, use a capacitance of 0.01μF. (5 Marks)

Q5. Explain the operation of 2nd order high pass filter with neat circuit diagram and relevant waveforms. Deduce the expression for the transfer function.

(OR)

Q6. (a) Explain the operation of Monostable multivibrator using 555 timer. Derive the expression for time delay of a Monostable multivibrator using 555 timer. (5 Marks)

(b) Design monostable multivibrator using 555 timer to produce a pulse width of 100 msec. (5 Marks)

Q7. (a) Explain the functional block diagram of IC723 regulator. (5 Marks)

(b) Design a current limit circuit for a IC 723 regulator to limit the current to 60 mA. (5 Marks)

(OR)

Q8. (a) Explain the operation of a multiplying DAC and mention its applications. (5 Marks)

(b) A 12-bit D to A converter has a full-scale range of 15 volts, its maximum differential linearity error is ± 1/2 LSB. Determine the percentage resolution, and the minimum and maximum possible values of the increment inits output voltage? (5 Marks)

Q9. (a) Sketch the logic diagram equivalent to the internal structure of an 2 input CMOS NAND gate. (5 Marks)

(b) Implement ABC' + AB'C + A'BC' using a 3 to 8 decoder. (5 Marks)

(OR)

Q10. (a) Design a conversion circuit to convert a T flip-flop to D flip-flop. (5 Marks)

(b) Explain the operation of parallel-in-parallel-out shift register. (5 Marks)

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-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. Give an example for open loop and closed loop control system.
2. Define settling time
3. What is centroid?
4. What is the need for compensator?
5. What are state variables?

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

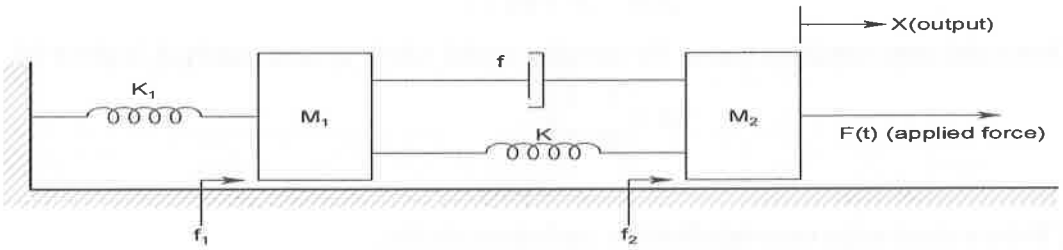
1. Find the unit impulse response of $H(s) = \frac{5s}{(s+2)}$ with zero initial conditions.
2. Explain Mason's Gain Formula.
3. Differentiate between type and order of a system
4. What do you mean by peak overshoot?
5. Distinguish between absolute and marginal stability
6. What do you mean by a) breakaway point b) break-in point c) when do they occur and how they are determined?
7. What is correlation between phase margin and damping factor?
8. Sketch the electrical circuit of a lead-lag compensator.
9. Discuss the relationship between state equation and transfer function.
10. What are the applications of state variable techniques in electrical systems?

PART-B

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

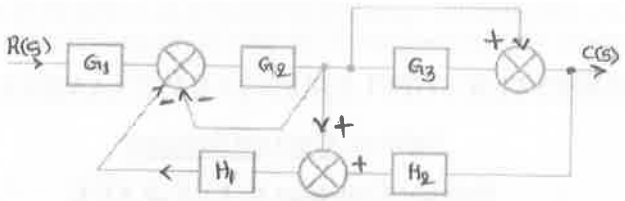
1. (a) Describe the effect of feedback on gain, sensitivity, bandwidth and stability.

(b) Obtain the transfer function of the mechanical system shown below.



(OR)

2. Draw the signal flow graph for the block diagram given below and obtain the transfer function using Mason's gain formula.



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)A unity feedback control system has an amplifier with gain K_A=16 and gain ratio, $G(s)=\frac{1}{s(s+4)}$ in the forward path. A derivative feedback, $H(s)=sK_0$. Determine K_0, so that the damping ratio is 0.5.

(b)What is the effect of derivative control on damping ratio, peak overshoot and rise time?

5. (a) For the given characteristic equation $s^6+2s^5+8s^4+12s^3+20s^2+16s+16=0$, test for stability and determine the location of roots using R-H criteria.

(b)State the advantages of R-H Stability criterion.

(OR)

6. Draw the root locus for the system with $G(s)H(s)=\frac{K(s+5)}{s(s+1)(s+2)}$. Determine the value of K and comment on stability.

7. Explain the frequency Domain specifications of a typical system.

(OR)

8. (a) What is the effect on polar plot if a pole at origin is added to the transfer function? Explain. Draw the polar plot of a first order system.

(b)For the following system, sketch the polar plot: $G(s)H(s)=\frac{500}{s(s+6)(s+9)}$.

9. (a) Obtain the state model of the system described by the following transfer function.

$$\frac{y(s)}{u(s)}=\frac{5}{s^3+6s+7}$$

(b)Obtain the state transition matrix for the state model whose system matrix A is given by

$$A=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$$

(OR)

10. (a) Write a short notes on controllability and observability.

(b) Check the controllability of the following state space system.

$\dot{x_1}=x_2+u_2$

$\dot{x_2}=x_3$

$\dot{x_2}=-2x_2-3x_3+u_1+u_2$

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-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. List out at least two merits of IGBT.
2. Define free wheeling diode.
3. Define Dual Converter.
4. Define AC Voltage controller.
5. Define Chopper.

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

1. What losses occur in a thyristors during working conditions?
2. What is the importance of line commutation?
3. What is meant by overlapping period in phase controlled converters?
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 advantages of cyclo converters as compared to AC voltage controllers?
8. Draw the equivalent circuit of cyclo-converter.
9. Draw the output waveform of a single phase AC chopper.
10. What type of commutation is used in basic series inverter?

PART-B

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

1. a) Draw dynamic characteristics of SCR during turn off. Explain how turn off process can be carried out?

b). Explain two-transistor analogy of SCR.

(OR)

2. Explain the construction of SCR with neat diagram. Draw its V-I characteristics.

3. a) Describe with neat circuit diagram and associated waveforms, operation of a 1- Φ half wave controlled converter with Inductive load.

b) A 1- phase full bridge converter using four SCRs feeds power to RLE load with R=10 Ω, L = 100mH, and E = 100V. The ac source voltage is 230 V at 50Hz. Assuming continuous conduction; determine the average value of load current for firing delay angle 45°.

(OR)

4. Explain the operation of Single phase Bridge type Full Converter with RL – load with neat waveforms.

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

(OR)

6. a) Derive the expression for the RMS load voltage of six pulse converter with R load .

b) In a single phase midpoint converter turns ratio from primary to each secondary is 2. The source voltage is 230V, 50 Hz. For a resistive load of 5Ω, calculate the maximum value of average output voltage and load current and the corresponding firing and conduction angles.

7. a). Distinguish between an AC voltage controller and a cyclo-converter with respect to operation and control aspects.

b). Derive the expression for rms value of output voltage of single phase bridge type AC voltage controller.

(OR)

8. Describe the operating principle of single-phase to single-phase step-up cyclo-converter with the help of mid-point and bridge type configuration. Illustrate with appropriate circuit and waveforms.

9. a) Describe the Morgan chopper with associated voltage and current waveforms.

b) Enumerate the merits of Morgan chopper compared to Jones chopper.

(OR)

10. a) Draw the circuit diagram of a single phase half bridge inverter and explain its operation.

b) A three phase bridge inverter delivers power to a resistive load from a 400V DC source. For a star connected load of 8Ω per phase, determine RMS value of load current and RMS value of thyristor current for 1200 conduction mode of operation.