Code No.: **40210**

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, MAY-2019

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. Define Transposition?
2. Define the velocity of propagation of travelling waves in overhead lines.
3. Write the coefficient of reflection and refraction for a short circuit line?
4. Describe the types of insulators in overhead lines?
5. What are the properties of insulation of insulated cables?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Define GMD & GMR of a transmission line.
2. Write the factors affecting the Resistance of a transmission line.
3. Describe the simple classification of transmission lines.
4. Define efficiency and regulation of a transmission line?
5. Define reflection and refraction coefficients?
6. Explain attenuation of travelling waves?
7. List out the various methods to improve string efficiency.
8. Define Ferranti Effect?
9. Write the practical difficulties in grading of cables?
10. Merits and demerits of Underground cables.

PART-B

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

1. a) What are bundled conductors? Discuss the advantages of Bundled conductors.

   b) Determine the capacitance per km of a pair of parallel conductors 1.5cm in diameter and spaced informing 65cm apart in air, also find charging current per km if line is working at 110kv.

OR

2. a) Derive the expression for inductance of 3-phase transmission line?

   b) Calculate the capacitance of 3-phase double circuit line D=7metres radius or each conductor 1.38cm

3. a) The effect of capacitance is neglected in short transmission lines. Justify?

   b) What is the effect of load power factor on regulation and efficiency of a transmission line?

OR

4. a) Derive the ABCD constants for long transmission lines. **[6]**

   b) Find the ABCD parameters of a 3-phase 80km, 50Hz transmission line with series impedance of (0.15+j0.28) ohms per km and a shunt admittance of $j5x10^{-4}$ mho per km. **[4]**

5. When the transmission line is terminated by an inductive load and capacitive load, how do you find the reflected voltage wave and current wave.

OR

6. a) Define corona loss & factors affecting on corona & methods of reducing corona loss?

   b) How the waves are travelling on transmission line? Explain variation in voltage& current if line is ended with A) open end line B)short circuited line

7. Explain the phenomenon of corona with necessary derivations? Discuss the factors which affect corona power loss?

OR

8. a)What is corona? What are its effects and how they are reduced?

   b) Define critical disruptive, voltage and visual critical disruptive voltages and give their formulas.

9. A transmission line conductor at a river crossing is supported from two towers at heights of 50 m and 70 m above water level. The horizontal distance between the towers is 270 m, if the tension in the conductor is 2000 Kg. Find

   (a) maximum clearance between the conductor and water

   (b) The clearance between the conductor and water at a point midway between the towers. Here the weight of the conductor is 0.75 Kg/m, Assume that the conductor takes the shape of parabola. 10.

OR

10. a) Derive the expression for sag when the supports are at equal heights and the wind and ice effects are also considered.

    b) An overhead transmission line has a span of 220 meters, the conductor weighing 804 kg/km. Calculate the maximum sag if the ultimate tensile strength is 5758kg.Assume a safety factor of 2.

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Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

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. Mention some of the applications of controlled rectifier.
3. Define Dual Converter.
4. What is the necessity of firing circuit?
5. Define Duty Cycle.

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. What losses occur in a thyristors during working conditions?
2. List out the different types of commutation techniques.
3. What is meant by overlapping period in phase controlled converters?
4. SCR's with rating of 1200 V and 250A are used in a string to handle 5 KV and 2 KA .Calculate the no of series connected SCR's units required in case de-rating factor is 0.2
5. What are the applications of dual converters?
6. List out the advantages of six pulse converters over three pulse converters.
7. Give the classification of Cycloconverters
8. What is the principle of operation of 1-phase cyclo converter?
9. What type of commutation is used in basic series inverter?
10. Give the expression for load voltage of step up chopper.

PART-B

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

1. a) Explain the need of commutation circuits. What are the different methods of Commutation schemes?
   b) Explain the operation of power MOSFET with the help of its schematic diagram.

OR

2. a) Explain the operation of UJT firing circuit with the help of its schematic diagram
   b) What are the various applications of an 1GBT?
3. Explain the operation of Single phase Bridge type Full Converter with RL - load with neat waveforms.

OR

4. a) Explain the operation of a single-phase, half-wave converter for R-load with neat circuit diagram and necessary waveforms.
   b) A resistive load of 10 ohms is connected through a half-wave SCR circuit to 220V, 50Hz, 1-phase source. Calculate the power delivered to load for a firing angle of 60 degrees.
5. Explain the operation of Three phase half controlled converter with Resistive load with necessary waveforms.

OR

6. a) Explain the operation of a three phase three pulse converter with RL load with neat circuit diagram and necessary waveforms.
   b) Explain the operation of single phase dual converter with relevant circuit diagram and waveforms.
7. 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.

OR

8. a) Explain the operation of a cycloconverter. Mention the applications of cycloconverter.
   b) Derive the RMS load voltage for a single -phase AC Voltage Controller with R - load
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. With neat circuit diagram & waveforms explain the operation of single phase Half-bridge inverter with R& RL load.

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

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. What is double layer winding?
2. What is synchronous Impedance?
3. What is Slip test?
4. Define sub transient reactance?
5. How to suppress hunting?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. A certain alternator has 6 slots per pole and the coils are short pitched by 1 slot. The coil span is 15 slot pitches. Calculate the pitch factor?
2. Why integral and fractional slot windings are used in synchronous generator?
3. Define leakage reactance of an alternator?
4. Draw the Z.P.F. characteristics of synchronous generator.
5. Why M.M.F. method of calculating voltage regulation considered as optimistic method?
6. What is two reaction theory? Who proposed it?
7. Write applications of synchronous motor
8. Define sub transient and transient reactance. Write its increasing order.
9. Define the following I) Starting Torque ii) Running Torque
10. Write the advantages of permanent magnet synchronous motors.

PART-B

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

1. Determine the slot distribution &the pole phase group sequence for a 45slot, 6pole, 3phase armature winding.

OR

2. a) Derive the expression of coil span factor and Distribution factor? b) Explain the difference between stationary armature & rotating armature. What are the advantages of rotating armature over stationary armature?
3. What are the causes of harmonics in the e.m.f. waveforms of synchronous generators and what means are adopted to minimize them?

OR

4. What is residual voltage? Draw OCC and SCC characteristics of synchronous generator with suitable diagram

5. a) Explain the two reaction theory applicable to salient pole synchronous machine?

   b) A 3-phase salient pole synchronous generator has Xd = 0.8 p.u, Xq = 0.5 p.u. and Ra = 0 ohm. Generator supplies full load at 0.8 pf lagging at rated terminal voltage. Compute,

   i) Power angle and ii) No load voltage if excitation remains constant.

OR

6. An alternator has a direct axis synchronous reactance of 0.7 per unit and a quadrature axis reactance of 0.4 pu. It is used to supply full load at rated voltage at 0.8pf, find the total induced emf on open circuit.

7. a) Two 50 MVA, 3 phase alternators operate in parallel. The settings of governors are such that the rise in speed from full load to no load is 2% in one machine and 3% in the other, the speed load characteristics being straight lines in both cases. If each machine is full loaded, when the total load is 100 MW, what would be the load on each machine when the total load is 60 MW? **(6M)**

   b) Explain the effect of change in excitation on the parallel operation of two alternators? **(4M)**

OR

8. Why 3-phase synchronous motors are not self starting? Explain with working principle

9. a) Derive the power angle characteristics of synchronous motor. **(7M)**

   b) Compare variable reluctance stepper motor and permanent magnet stepper motor. **(3M)**

OR

10. a) Explain the principle of working of universal motor and its applications.

    b) Describe briefly the effect of varying excitation upon armature current and power factor of a synchronous motor when input power to the motor is maintained constant.

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

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 any two dynamic characteristics of measuring Instruments.
2. Why an ammeter should have a low resistance value.
3. List out different types of energy meters.
4. Significance of Bridges.
5. Differentiate the principle of dc potentiometer and ac potentiometer.

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Why critical damping is important?
2. How are basic instruments converted into higher range ammeter?
3. Define creeping in energy meter.
4. Discuss the advantages and disadvantages of Anderson's bridge.
5. What are the applications of DC potentiometer?
6. Why scales of the gravity control instruments are not uniform but are crowded?
7. What are the essential torques required for operating and instrument?
8. Explain the concept of burden of instrument transformers.
9. What are the two conditions of balance in AC bridges?
10. List out the types of accessories for measuring instruments.

PART-B

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

1. Draw the block diagram of the measuring system and explain the each stage with their functions.

OR

2. Illustrate the following systems of electrical units
   i) The CGS electrostatic systems of units ii) The CGS electromagnetic systems of units
   iii) The practical systems of units iv) The MKS system of units
   v) The rationalised MKS systems of units
3. a) Explain the working principle of PMMC instrument with a neat sketch
   b) State the advantages and dis-advantages of PMMC instrument.

OR

4. a) Explain the types of digital voltmeters in detail.
   b) Explain digital multimeter with neat block diagram.
5. Describe the construction & working of electro dynamo meter wattmeter. Derive the expression for torque when the instrument is used on a.c.

OR

6. a) Write difference between current transformer and potential transformer.
   b) Explain the operation of LVDT with neat diagram.
7. a) Write a note on types of sources and detectors used for a.c. bridges.
   b)With neat sketch, explain Kelvin double bridge. Obtain an expression for the balancing condition.

OR

8. Explain the construction, working and operation of Anderson Bridge to measure the Inductance with suitable diagram.
9. An electro-dynamic wattmeter calibrated on its 60V, 0.5A range indicates 30W full scale. The measured current and voltage at full scale are precisely 0.5A and 75V respectively. Determine wattmeter error and correction figure.

OR

10. Explain the following terms: i) Low capacitance probes ii) High voltage probes
    iii) Shielded Cables iv) RF demodulator probes

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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

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. What is 'Type' of the system?
3. What is the sufficient condition for stability?
4. What is the need for compensator?
5. What are state variables?

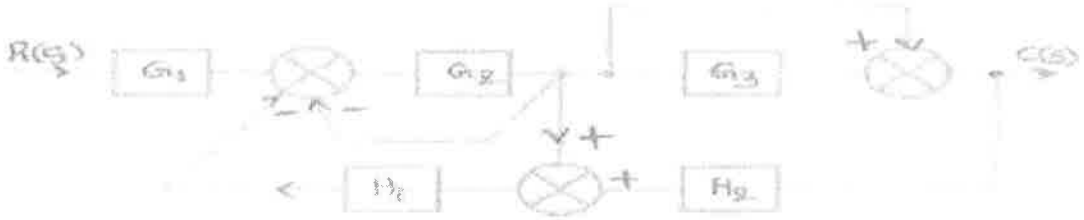
II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Explain Mason's Gain Formula.
2. What are the advantages and disadvantages of feedback in control systems?
3. Find the unit impulse response of $H(s) = \frac{5s}{(s+2)}$) with zero initial conditions.
4. Define position error constant and velocity error constant.
5. Distinguish between absolute and marginal stability
6. Write the necessary conditions for Routh Hurwitz criteria.
7. What is correlation between phase margin and damping factor?
8. Write short notes on P I, and HD controllers.
9. State the terms controllability and observability.
10. Draw the block diagram of state model.

PART-B

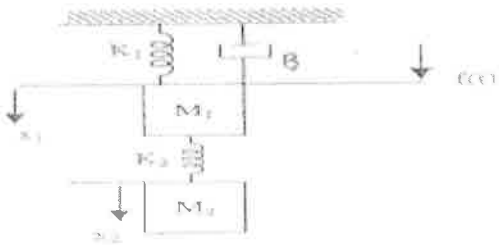
Answer **ALL** questions of the following **5x10 Marks= 50Marks**

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



OR

2. a) Define transfer function and discuss its limitations.
   b) Derive the Transfer Function X(s) /F(s), for the mechanical system shown below:[i. e. $X_1(s)/F(s)$]



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III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY - 2019

Subject: **Linear & Digital IC Applications**

Branch: **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. What does PLL mean?
4. What is the main drawback of a dual-slope ADC?
5. Draw basic CMOS NAND gate?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Define Operational Amplifier. Draw internal block diagram of Operational Amplifier
2. What are the areas of application of non-linear op-amp circuits?
3. Why do we use higher order filters? Give any two reasons.
4. What is an switching regulator?
5. Explain why NMOS transistor produces weak '1' and PMOS transistor produces weak '0'?
6. Convert RS Flip-Flop to JK Flip-Flop.
7. List out the direct type ADCs.
8. Mention some areas where PLL is widely used.
9. Compare integrator and differentiator.
10. Explain briefly about AC Characteristics of op-amp.

PART-B

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

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

OR

2. a) Draw the pin diagram and schematic symbol of a typical OP-AMP IC 741 and explain the function of each pin?
   b) Explain how dual supply operation is obtained from single supply connection?
3. Explain in detail of a basic differential amplifier

OR

4. a) Sketch and explain the circuit operation of log amplifiers. Calculate output voltages for a given input and show how temperature dependence is minimized.
   b) With the help of a neat circuit diagram, explain the operation of a three op-amp instrumentation amplifier and obtain the expression for its output voltage?
5. Explain working of PLL using appropriate block diagram and explain any one application of the same.

OR

6. a) Discuss about the design of All-pass filters.
   b) Design a second order low-pass Butterworth filter with a cut-off frequency of 12KHz and unity gain at low frequency. Also determine the voltage transfer function magnitude in dB at 15Hz for the filter
7. a) Explain the functional block diagram of IC723 regulator.
   b) Design a current limit circuit for a IC 723 regulator to limit the current to 60 mA.

OR

8. With neat sketch explain the working of a flash type ADC.
9. a) Sketch the logic diagram equivalent to the internal structure of an 2 input CMOS NAND gate.
   b) Implement ABC' + AB'C + A'BC' using a 3 to 8 decoder.

OR

10. Design CMOS transistor circuit for 2-input OR gate. Explain the circuit with the help of function table?