Hall Ticket Number :										

R-14

Code: 4G251

III B.Tech. I Semester Supplementary Examinations November 2018

Electrical Machines-III

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Distinguish between salient pole rotor and cylindrical rotors in synchronous machine. 7M

   b) Derive the expression for distribution factor for armature windings in synchronous generators. 7M

OR

2. a) Explain the causes for the production of harmonics in generated EMF and methods to eliminate the harmonics. 7M

   b) A 4 – pole 3- phase, 50Hz star- connected alternator has 60 slots, with 2 conductors per slot and having armature winding of the two-layer type. Coils are short pitched in such a way that if one coil side lies in slot number 1, the other lies in slot number 13. Determine the useful flux per pole required to generate a line voltage of 6000V. 7M

UNIT–II

3. a) Explain the phenomenon of armature reaction when a alternator is delivering a load current at i) purely lagging pf ii) unity pf and iii) purely lagging pf 7M

   b) Explain the American Standard Association method to find the voltage regulation. 7M

OR

4. a) Discuss Blondel's two reaction theory applicable to salient pole synchronous generator. 7M

   b) A 10 KVA, 380 V, 50-Hz, 3-ph star connected salient pole alternator has X_d = 12 Ω and X_q = 8 Ω and Ra= 1 Ω/ph. The generator delivers rated load at 0.8 pf lagging. Determine the excitation voltage (E) of the generator. 7M

UNIT–III

5. a) Derive the expression for synchronizing power for salient pole machine. 7M

   b) A 3MVA,6- pole alternator runs at 1000 rpm in parallel with another machine on 3.3 kV busbars. The synchronous reactance is 25%. Calculate the synchronizing power per mechanical degree of rotor displacement at no load and the corresponding synchronizing torque. 7M

OR

6. a) Explain the operation of alternator on infinite busbar with varying excitation and by keeping steam input as constant. 7M

   b) A 3- phase star connected alternator with R=0.4Ω and X = 6Ω per phase delivers 300A at power factor 0.8 to constant frequency 10 kV busbars. If the steam supply is unchanged, find the percentage change in the induced emf necessary to rise the power factor to unity. Ignore the change in loss. 7M

UNIT–IV

7. a) Explain the effect of damper winding on the performance of a synchronous machine. 7M

   b) Explain the procedure to plot 'V curves' and 'inverted V' curves for a given synchronous machine with the help of circle diagrams. 7M

OR

8. a) What is a synchronous condenser? What is the use of synchronous condenser? 7M

   b) A synchronous motor absorbing 60 kW is connected in parallel with a factory load of 240 kW having a lagging power factor of 0.8. If the connected load has a power factor of 0.9 lagging. What is the leading kVAR supplied by the motor and at what power factor the motor is operating. 7M

UNIT–V

9. a) Describe the construction and principle of operation of split phase motor. 7M

   b) Explain operation and torque versus stepping rate characteristics of a stepper motor. 7M

OR

10. a) Describe construction and principle of operation of single phase induction motors on the basis of double revolving field theory. 7M

    b) Draw the phasor diagram of an ac series motor. How can its performance be analyzed? Draw its typical characteristics. 7M

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Hall Ticket Number :										

R-14

Code: 4G359

III B.Tech. I Semester Supplementary Examinations November 2018

Linear and Digital Integrated Circuits Applications

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Draw and explain the internal block schematic of an operational amplifier. 7M
   b) Explain in brief about the dc characteristics of an op-amp. 7M

OR

2. a) Explain the classification of ICs according to their method of fabrication. 7M
   b) Discuss about analysis of Dual input balanced output amplifier. 7M

UNIT–II

3. a) Explain Schmitt trigger operation using 555 timer with its circuit diagram. 7M
   b) Give the block diagram of NE 565 PLL and explain the role of each block. Explain how PLL is used as FM demodulator? 7M

OR

4. a) Draw the internal circuit diagram of a 555 timer IC and explain how does it functions as astable multivibrator. 7M
   b) Define the terms ‘Lock range’, ‘Capture range’ and ‘Pull in time’ pertaining to PLL. Derive the relationship between lock range and capture range. 7M

UNIT–III

5. a) What is successive approximation ADC? And discuss how it is better than counter type A/D converter? 7M
   b) Sketch the circuit of a R-2R DAC, explain its operation, and calculate the analog output for any given digital input. Explain the performance of R-2R DAC comparing with that of the weighted-resistor DAC. 7M

OR

6. a) Draw the schematic block diagram of dual-slope A/D converter and explain its operation. Derive expression for its o/p voltage ‘V0’. 7M
   b) Draw circuit diagram and explain the 4-bit weighted resistor type D/A converter in detail. What are the limitations of weighted resistor type D/A converter? 7M

UNIT–IV

7. a) Design CMOS NAND gate and analyze its behavior using switch models 7M
   b) Explain the CMOS dynamic electrical behavior with neat sketches and necessary equations. 7M

OR

8. a) Explain the operation of the CMOS AND OR INVERT gate with neat sketches and draw the functional table. 9M
   b) Compare the totem pole and open collector outputs of a TTL 5M

UNIT–V

9. a) Write short notes on priority encoder. 7M
   b) Explain the logic diagram and functional table of 8 to 1 line multiplexer. 7M

OR

10. a) Design a combinational circuit that converts 4-bit binary to 4-bit gray code 7M
    b) Design and realize the Full Subtractor circuit 7M

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Hall Ticket Number :										

R-14

Code: 4G253

III B.Tech. I Semester Supplementary Examinations November 2018

Power Electronics

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the switching characteristics of power MOSFET. 10M
   b) Compare power MOSFET and power BJT. 4M

OR

2. Describe in detail the various methods of turning off a thyristor 14M

UNIT–II

3. Explain the two transistor analogy of a thyristor and derive an expression for the anode current using this analogy. 14M

OR

4. Explain how a thyristor can be protected against over voltages and over currents. 14M

UNIT–III

5. a) With relevant circuit diagram and waveforms, explain single phase full bridge converter with RLE load for rectifier mode. 7M
   b) A single phase full converter feeds power to RLE load with R= 4 Ω, L= 4mH and E = 80 V. The AC source voltage is 230 V, 50 Hz. For continuous conduction, find the average value of load current for a firing angle delay of 30^o. In case any one of the SCR's gets open circuited find the new value of average load current 7M

OR

6. a) With relevant circuit diagram and waveforms, explain three phase fully controlled converter with RLE load for $\alpha = 45^o$. 7M
   b) A threephase full converter charges a battery from a three phase supply of 230 V, 50Hz. The battery emf is 190 V and its internal resistance is 0.5 Ω. On account of inductance connected in series with the battery, charging current is constant at 25 A. Compute firing angle delay and the supply powerfactor. 7M

UNIT–IV

7. a) Draw the circuit and explain the working of step-down chopper. Also derive the expression for output voltage. 10M
   b) A d.c. to d.c. chopper operates from a 48 V source with a resistive load of 24Ohm. The chopper frequency is 250Hz. Find the rms current when Ton= 3 ms 4M

OR

8. Explain the working of a four quadrant chopper with relevant diagram and waveforms 14M

UNIT–V

9. Describe a single phase capacitor commutated current source inverter connected to load R with the help of its power circuit diagram and waveforms. From the equations governing its performance derive the equation for output voltage. 14M

OR

10. Describe the working of a single phase parallel inverter with relevant circuit and waveforms. Also derive expression for the capacitor voltage. 14M

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Hall Ticket Number :										

R-14

Code: 4G252

III B.Tech. I Semester Supplementary Examinations November 2018

Transmission of Electric Power

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) What is Skin and Proximity effect in transmission line? 7M

   b) Calculate the inductance of each conductor in a 3Φ, 3 wire system when the conductors are arranged in a horizontal plane with spacing such that D_{11}=4m, $D_{12}=D_{23}$=2m. The conductors are transposed and have a diameter of 2.5cm. 7M

OR

2. a) Derive an expression for line to neutral capacitance for a 3Φ overhead transmission line when the conductors are unsymmetrically placed but transposed. 7M

   b) A 1Φ transmission line has two parallel conductors 3m apart, radius of each conductor being 1cm. The height of the line is 10m above the ground. Calculate the capacitance of the line (a) considering the effect of earth (b) neglecting the effect of earth. 7M

UNIT–II

3. a) Derive the expression for voltage regulation of a short transmission line with neat vector diagram. 7M

   b) A 3Φ, 50Hz transmission line 100km long delivers 20MW at 0.9pf lagging and at 110KV. The resistance and reactance of the line/phase/km are 0.2ohms and 0.4ohms respectively, while capacitance admittance is $2.5x10^{-6}$ Siemens/km/phase. Calculate a) the current and voltage at the sending end b) efficiency of transmission. Use Nominal – T Method 7M

OR

4. a) Discuss why receiving end voltage of an unloaded long line may be more than the sending end voltage. 7M

   b) A 275KV overhead transmission line has the following characteristics Z= 12.5+j66 ohms, Y = $4.4x10^{-4} \angle 90^0$ Siemens. Calculate the ABCD constants and the surge impedance of the line. 7M

UNIT–III

5. a) Show that in a string of suspension insulators the disc nearest to the conductor has the highest voltage across it. 7M

   b) A 3Φ transmission line is being supported by 3-disc insulators. The potential across top unit and middle unit are 8KV and 11KV respectively. Calculate a) the ratio of capacitance between pin and earth to the self capacitance of each unit b) the line voltage and c) string efficiency. 7M

OR

6. a) What is sag in overhead lines? Discuss the disadvantages of providing too small or too large sag on a line. 7M

   b) Explain the following terms with respect to corona
   i) Critical disruptive voltage ii) visual critical voltage and iii) power loss due to corona. 7M

UNIT–IV

7. a) Show that a travelling wave moves with a velocity of light on the overhead line 7M
   b) What are the causes of system transient and types of transients in a transmission line 7M

OR

8. a) Explain in brief the reflection and refraction of waves in a transmission line 7M
   b) Explain attenuation and distortion of travelling wave along a line 7M

UNIT–V

9. a) Derive the expression for the insulation resistance of the single core cable. 7M
   b) A 11KV, 50Hz single phase cable has the diameter of 10mm and internal sheath radius of 15mm. If the dielectric has a relative permeability of 24. Determine for a 2.5km length cable a) the capacitance and b) the charging current 7M

OR

10. a) Describe the construction of the cable with neat diagram 7M
    b) Explain capacitance grading of a cable with neat diagram 7M

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