Hall Ticket Number :

III B.Tech. I Semester Supplementary Examinations February 2022
Electrical Machines-III
(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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UNIT–I

1. a) Compare the salient features of projecting pole rotor and round rotor.   7M

    b) Find the pitch factor for the winding of 36 slots, 4 poles, coil span 1 to 8.   7M

OR

2. a) Explain how the harmonics in the generated EMF can be suppressed in synchronous machines.   6M

    b) A 3-Ph, 50 Hz, 8 pole alternator has a star connected winding with 120 slots and 8 conductors/slot. The flux per pole is 0.05wb, sinusoidally distributed. Determine the phase and line voltages. Let the winding factor as 0.956.   8M

UNIT–II

3. With the help neat diagram, explain how OC and ZPF tests are conducted. Explain the procedure to find the regulation using ZPF method.   14M

OR

4. a) Explain the effect of load power factor on armature reaction of 3 ph alternator.   7M

    b) Find the voltage regulation at full load, 0.9 power factor lagging for a three phase, 1000 kVA, 5000 V, star connected alternator having an armature resistance of 0.08 per phase and a synchronous reactance of 7   per phase.   7M

UNIT–III

5. a) List the methods of synchronizing 3-Ph alternator to the infinite bus bar.   7M

    b) Explain two bright and one dark lamp, synchroscope method with neat diagram.   7M

OR

6. a) What is an infinite bus? Mention the conditions to be satisfied prior to synchronizing an alternator to infinite bus bar.   7M

    b) A 10MVA 3-ph alternator has a reactance of 20%. Calculate the total synchronizing power of armature per mechanical degree of phase displacement when running in parallel on 10KV, 50Hz bus at 1500rpm.   7M

UNIT–IV

7. a) Name the different starting methods of synchronous motor, explain how the synchronous motor can start with help of damper winding.   7M

    b) State the main features of synchronous motor. Mention its applications.

OR

8. a) Describe how the synchronous motor can operate as synchronous condenser   7M

    b) A 400V, 50Hz, 33.7KW, 3 ph star connected SM has a full load efficiency of 88%. The synchronous impedance of motor is (0.2 +j1.6)   /ph. If the motor excitation is adjusted to give a leading p.f of 0.9. Calculate line induced e.m.f.   7M

UNIT–V

9. a) Discuss in detail about the working principle of split phase motor with neat diagram.   7M

    b) Explain in detail about double revolving field theory.   7M

OR

10. a) Explain the principle of operation of single phase induction motor.   7M

    b) Explain the operating principle of shaded pole motor.   7M

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III B.Tech. I Semester Supplementary Examinations February 2022
Power Electronics
(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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		Marks	CO	Blooms Level

UNIT–I

1. a) Describe the constructional details of an SCR with the help of schematic diagram and the circuit symbol. — 7M — 1 — 2
   b) Explain the various turn-on methods of SCRs. — 7M — 1 — 2

OR

2. a) Calculate the number of SCRs each with rating of 500 V ,75A required in each branch of a series and parallel combination for a circuit with the total voltage and current rating of 7.5KV and 1000A. Assume derating factor of 14%. — 7M — 1 — 3
   b) Explain briefly parallel connection of SCRs. — 7M — 1 — 3

UNIT–II

3. Explain briefly the specifications and ratings of SCRs. — 14M — 2 — 2

OR

4. a) Discuss about over voltage protection by metal oxide varistors. — 7M — 2 — 4
   b) Analyze the cooling mechanism and mounting of thyristors. — 7M — 2 — 4

UNIT–III

5. a) Explain the operating principle of single phase half wave controlled rectifier with 'R' load. — 7M — 3 — 2
   b) Summarize the role of freewheeling diode in converters. — 7M — 3 — 2

OR

6. a) Explain the operation of single phase fully controlled bridge rectifier with 'RL' load with neat circuit diagram and necessary waveforms. — 7M — 3 — 3
   b) A two pulse converter is fed with a 230V, 50 Hz supply. The load on the converter is a pure resistance of R=10 . Obtain the average output voltage for a firing angle of =135° — 7M — 3 — 3

UNIT–IV

7. Define a dc chopper? Describe the various types of chopper configurations briefly with necessary sketches. — 14M — 4 — 2

OR

8. With a neat circuit diagram, explain the operation of buck converter. Draw the load voltage and load current waveforms and derive the expression for the output voltage. — 14M — 4 — 3

UNIT–V

9. Differentiate CSI and VSI. — 14M — 5 — 2

OR

10. Analyze series inverter with neat circuit diagram and waveforms. — 14M — 5 — 4

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Code: 5G252

R-15

III B.Tech. I Semester Supplementary Examinations February 2022
Transmission of Electric Power
(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours
Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)
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		Marks	CO	Blooms Level
	UNIT–I			
1.	Develop the expression for the Inductance per unit length of an overhead line from the basics of magnetic fields.	14M	1	6
	OR			
2.	Write Short notes on the following			
a)	Geometric Mean Distance	3M	1	1
b)	Geometric Mean Radius	2M	1	1
c)	Transposition	6M	1	1
b)	Bundling of Conductors	3M	1	1
	UNIT–II			
3. a)	Derive the approximate voltage regulation expression for short transmission line.	8M	2	5
b)	Evaluate ABCD constants for Short Transmission line	6M	2	5
	OR			
4. a)	Discuss in detail the nominal- representation with neat circuit diagram and phasor diagram. Derive also its performance specifications.	14M	2	2
	UNIT–III			
5.	Determine the relation between sending end parameters and receiving end parameters of a long transmission line using rigorous solution.	14M	2	5
	OR			
6. a)	What is surge impedance? Define Surge Impedance loading? What is the relation of SIL with Ferranti effect?	6M	2	1
b)	A 800KV transmission line is having per phase line inductance of 1.1mH/km and per phase line capacitance of 11.68nF/km. Ignoring the length of line, what is the surge impedance loading of the line.	8M	2	3
	UNIT–IV			
7. a)	Give a mathematical analysis to show the velocity of propagation of wave depends on the inductance and capacitance of the line	8M	3	2
b)	Derive the transmission and reflection coefficients for voltage and currents of a line of impedance 'Z' is terminated by a resistor of value 'R'.	6M	3	3
	OR			
8. a)	Define the following i) Reflection ii) Refraction iii) Attenuation iv)Distortion	7M	3	1
b)	Explain the phenomenon of wave travelling from sending end to receiving end.	7M	3	2
	UNIT–V			
9.	Give an elaborate discussion on types of insulating materials used for UGC and different varieties of Underground Cables.	14M	5	6
	OR			
10. a)	Find the Voltage distribution of 5 disc insulator string and prove that voltage distribution is not uniform.	8M	4	1
b)	What is the effect of non-uniform voltage distribution on string efficiency? Explain with an illustration of 5 disc insulator string.	6M	4	3

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III B.Tech. I Semester Supplementary Examinations February 2022
Electrical and Electronic Measurements
(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours
Answer any *five full* questions by choosing one question from each unit (5 x 14 = 70Marks)
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		Marks	CO	Blooms Level

UNIT–I

1. a) Briefly explain characteristics of measuring instruments? — 7M, 1, 1

   b) Describe how a potential divider arrangement is used for multipliers used for multi range voltmeters. Derive expressions for resistance of different sections for a 4 range voltmeter? — 7M, 1, 3

OR

2. a) Describe the constructional details of an attraction type moving iron instrument with the help of a neat diagram. Derive the expression for deflection if spring control is used and comment upon the shape of the scale? — 10M, 1, 3

   b) Define limiting errors. Derive the expression for relative limiting error? — 4M, 1, 2

UNIT–II

3. a) Describe a circuit for testing of a single phase induction type energy meter at different loads and power factors? — 7M, 2, 2

   b) In a dynamometer wattmeter the moving coil has 500 turns of mean diameter 30 mm. Estimate the torque if the area of the field and the moving coils are at (i) 60^0 (ii) 90^0 when the flux density produced by field coils is 15×10^{-3} Wb/m^2, the current in moving coil is 0.05 A and the power factor is 0.866. — 7M, 2, 3

OR

4. a) Explain the special features incorporated in an electrodynamometer type of wattmeter so that it can be used for low power factor applications? — 10M, 2, 2

   b) Explain about Creeping error in single phase induction type energy meter — 4M, 2, 3

UNIT–III

5. a) Draw the circuit diagram of a Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance? — 7M, 2, 2

b) Describe the design and constructional features used in potential transformers for reduction of ratio and phase angle errors.   7M   2   2

OR

6. a) Describe the construction and working of a coordinate type a.c. potentiometer. How is it standardized? Explain how an unknown voltage measured with it.   7M   2   2

b) Explain in detail the effect of opening the secondary circuit of a current transformer when the primary winding is energized?   7M   2   2

UNIT–IV

7. a) Draw the circuit of a Wheatstone bridge and derive the conditions of balance.   7M   3   2

b) Explain how Wien's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters.   7M   3   2

OR

8. a) What are the different difficulties encountered in the measurement of high resistance? Explain how these difficulties are overcome.   7M   3   2

b) Derive the equation of balance for an Anderson's bridge. Draw the phasor diagram for conditions under balance.   7M   3   2

UNIT–V

9. a) What are the different types of amplifiers used for CROs? Describe the basis on which they are classified.   7M   4   2

b) Draw a basic circuit of a digital frequency meter using various sections. Explain the functions of each section.   7M   4   2

OR

10. a) Describe how the following measurements can be made with the use of a CRO:
   (i)   Frequency
   (ii) Phase angle   10M   4   2

b) List out the advantages and disadvantages of smart energy meters.   4M   4   2

END