| Hall Ticket Number : | | | | | | | | | | |
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**R-15**

**Code: 5G251**

III B.Tech. I Semester Supplementary Examinations Nov/Dec 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) A 3-Ph, 50Hz, 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

   b) Explain in detail about the constructional features of round rotor synchronous machines. 6M

**OR**

2. a) Develop the expression for distribution factor of a 3-Ph synchronous machine from fundamental. 7M

   b) Determine the distribution factor for 1-Ph alternator having 6 slots/pole
   (i) When all the slots are wound.
   (ii) When only four adjacent slots/pole are wound. 7M

**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. Discuss in brief about two reaction analysis of salient pole machine. How the voltage regulation can be computed for salient pole machine. 14M

**UNIT–III**

5. 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

**OR**

6. a) Discuss the effect of change of excitation of alternator when it is connected to Infinite bus bar. 7M

   b) Derive the load currents shared by two similar alternators when they are connected in parallel. 7M

**UNIT–IV**

7. a) State the main features of synchronous motor. Mention its applications. 7M

   b) Explain why the 3–Ph synchronous motor is not a self-starting motor? 7M

**OR**

8. What do you mean by constant power circles of synchronous motor? How it derived? 14M

**UNIT–V**

9. Explain about capacitor start capacitor run motors of a single phase induction motor. Draw its torque-slip characteristics. Also mention its merits and demerits. 14M

**OR**

10. Suggest and explain the modifications required to operate the DC series motor on AC supply. 14M

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| Hall Ticket Number : | | | | | | | | | | |
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**R-17**

**Code: 7G253**

III B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

# Electrical Power Transmission

(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 | BL |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 1. | | Determine the total reactive power of the line when the conductors of the line are forming a triangle whose sides are 4, 6 and 8m. Assume the diameter of the conductor as 1.2cm and the operating phase voltage is 220KV. | 14M | 1 | 5 |
| | | **OR** | | | |
| 2. | | Prove that Inductance/ph of 3-phase hexagonally spaced double circuit line is same with GMD-GMR method and Flux linkage method | 14M | 1 | 5 |
| | | **UNIT–II** | | | |
| 3. | | Discuss in detail the nominal-T representation with neat circuit diagram and phasor diagram. Derive also its performance specifications. | 14M | 2 | 2 |
| | | **OR** | | | |
| 4. | | A 3- Ø 50Hz 150km transmission line delivers 50 MW at 132 KV and 0.8 pf lagging. The Resistance and reactance of the line per phase per km are 0.1 Ω and 2 Ω respectively. The line admittance is 1.3X10-6 ʊ/km/ph. Compute Voltage Regulation and Transmission Efficiency by applying nominal T Method. | 14M | 2 | 3 |
| | | **UNIT–III** | | | |
| 5. | | Discuss in detail the different mathematical methods for obtaining ABCD constants of long line. | 14M | 2 | 2 |
| | | **OR** | | | |
| 6. | a) | Give the reasons why the resistance and inductance are considered as series elements and why the capacitance and conductance are considered as shunt parameters. | 4M | 2 | 2 |
| | b) | What is the difference between lumped parameters and distributed parameters? | 3M | 2 | 1 |
| | c) | Define Characteristic Impedance, Attenuation Constant and Phase Constant and also give their mathematical Expressions. | 7M | 2 | 1 |
| | | **UNIT–IV** | | | |
| 7. | | With neat sketches describe the travelling of the wave for open and short circuited ends at different time instants. | 14M | 3 | 4 |
| | | **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. | | What are the various types of insulators used for overhead transmission system? 4I48;7x;/19I plain each of them and their applications. | 14M | 4 | 1 |
| | | **OR** | | | |
| 10. | | Define String Efficiency? Discuss the different methods of improving string efficiency? | 14M | 4 | 1 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-17**

**Code: 7G254**

III B.Tech. I Semester Supplementary Examinations Nov/Dec 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 UJT triggering circuit with neat sketch. | 7M | 1 | 2 |
| | b) | Discuss series connection of SCRs. | 7M | 1 | 2 |
| | | **OR** | | | |
| 2. | | Discuss the different modes of operation of thyristor with the help of its static V-I characteristics. | 14M | 1 | 3 |
| | | **UNIT–II** | | | |
| 3. | | Explain briefly the specifications and ratings of SCRs. | 14M | 2 | 2 |
| | | **OR** | | | |
| 4. | a) | Explain briefly over current protection by fast acting current limiting fuse. | 7M | 2 | 4 |
| | b) | Show the improvement of dv/dt rating with the help of cathode short structure. | 7M | 2 | 4 |
| | | **UNIT–III** | | | |
| 5. | | Describe the operation of three phase semi converter with R load and also draw the output voltage waveforms | 14M | 3 | 2 |
| | | **OR** | | | |
| 6. | | Draw and explain the three phase bridge type 6 pulse converter with 'RL' load with neat circuit diagram and necessary wave forms also derive Average output voltage. | 14M | 3 | 3 |
| | | **UNIT–IV** | | | |
| 7. | | Explain the operation of step up chopper and derive an expression for its output voltage | 14M | 4 | 2 |
| | | **OR** | | | |
| 8. | | Analyze the four quadrant operation of chopper for continuous current conduction mode with neat circuit diagram. | 14M | 4 | 4 |
| | | **UNIT–V** | | | |
| 9. | | Differentiate CSI and VSI. | 14M | 5 | 2 |
| | | **OR** | | | |
| 10. | | Demonstrate the working of a single phase full bridge inverter supplying RL load with relevant circuit and waveforms. | 14M | 5 | 3 |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-17**

**Code: 7G251**

III B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

# AC Machines-II

(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) | Define pitch factor and distributed factor and winding factor | 7M | 1 | 2 |
| | b) | What are the advantages and disadvantages of short pitched and distributed winding in alternator? | 7M | 1 | 1 |
| | | **OR** | | | |
| 2. | a) | Describe the constructional details of cylindrical rotor and salient pole alternators. | 7M | 4 | 2 |
| | b) | An alternator has 18 slots/pole and first coil lies in slots 1 and 16. Calculate the pitch factor (i) fundamental (ii) $3^{rd}$ harmonic (iii) $5^{th}$ harmonic (iv) $7^{th}$ harmonic | 7M | 4 | 3 |
| | | **UNIT–II** | | | |
| 3. | a) | What is voltage regulation and explain how to calculate voltage regulation using Z.P.F method. | 7M | 1 | 2 |
| | b) | A 3-phase star connected alternator is rated at 1500 kVA, 12000 V. The armature effective resistance and synchronous reactance are 2 ohm and 3.5 ohm respectively per phase. Calculate the % regulation for a load of 1200 kW at (i) 0.8 lagging pf (ii) 0.8 leading pf. | 7M | 3 | 3 |
| | | **OR** | | | |
| 4. | a) | Derive an expression for voltage regulation of salient pole alternator based on two reaction analysis with neat diagrams | 7M | 5 | 4 |
| | b) | The Direct axis and quadrature axis synchronous reactances of a salient pole synchronous generator are 1.0 and 0.6 p.u respectively. Draw the vector diagram for full load, 0.8 power factor lagging and calculate the No load voltage and load angle. Neglect effect of saturation and armature resistance | 7M | 3 | 3 |
| | | **UNIT–III** | | | |
| 5. | a) | Discuss the need for connecting the alternators in parallel. Write the conditions for parallel operation of alternators. | 7M | 1 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | b) | A 750KVA, 11KV, 4 pole, 3-phase star connected alternator has percentage resistance and reactance of 1 and 15 respectively. Calculate the synchronizing power per mechanical degree placement (i) at no load (ii) at full load 0.8 pf lag. The terminal voltage in each case is 11KV. | 7M | 3 | 3 |
| | | **OR** | | | |
| 6. | a) | What is synchronization and derive expression for synchronizing power and torque. | 7M | 4 | 1, 4 |
| | b) | A 3 MVA, 6-pole alternator runs at 1000 RPM in parallel with other machines on 3.3 KV bus bars. The synchronous reactance is 20%. Calculate the synchronizing power per one mechanical degree of displacement and the corresponding synchronizing torque. | 7M | 3 | 3 |
| | | **UNIT–IV** | | | |
| 7. | a) | Explain the working principle of three phase synchronous motor | 7M | 1 | 2 |
| | b) | Write different power stages of 3-phase synchronous motor | 7M | 4 | 1 |
| | | **OR** | | | |
| 8. | | Derive the condition for maximum mechanical power developed by synchronous motor | 14M | 4 | 4 |
| | | **UNIT–V** | | | |
| 9. | a) | Explain the construction and working of A.C. Series motor with their characteristics | 7M | 1 | 2 |
| | b) | Draw and explain the construction and working of capacitor split single phase induction motor | 7M | 1 | 4 |
| | | **OR** | | | |
| 10. | a) | What is a Repulsion motor? With a connection diagram explain its operation | 7M | 1 | 2 |
| | b) | Draw the speed torque characteristics of Repulsion motor and list the applications of repulsion motor | 7M | 4 | 4 |

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