



Sanjay Ghodawat University, Kolhapur

2018-19

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Year and Program: 2018-19 School of Technology
SY B.Tech

Department of Electrical & Electronics
Engineering

Course Code: EET 204

Course Title: Electrical Machines.

Semester – IV

Day and Date Thursday
23-05-2019

End Semester Examination (ESE)

Time: Max Marks: 100

10.30 am to 1.30 pm.

Instructions:

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

| Q.1 | Solve any Two | Marks | Bloom's Level | CO |
|-----|--|-------|----------------|-----|
| a) | For a doubly excited magnetic system derive the expression of electromagnetic torque. | 07 | L ₂ | CO1 |
| OR | | | | |
| a) | Derive the expression for the electromagnetic torque in a singly excited system having salient pole type of stator. | 07 | L ₃ | CO1 |
| b) | Distinguish between self excited and separately excited dc generators. How self excited generators are classified? Give their circuit diagrams. | 08 | L ₃ | CO2 |
| OR | | | | |
| b) | Explain what is mean by back emf? Explain the significance of back emf on regulation of motor? | 08 | L ₃ | CO2 |
| Q.2 | Solve any Two | | | |
| a) | Draw the following characteristics of dc compound motor: (i) Armature current Vs Speed (ii) Torque Vs Speed (iii) Torque Vs Armature Current | 07 | L ₂ | CO3 |
| OR | | | | |
| a) | Draw the following characteristics of DC Shunt motor: (i) Armature current Vs Speed (ii) Torque Vs Speed (iii) Torque Vs Armature Current | 07 | L ₃ | CO3 |
| b) | A 4 pole dc shunt generator working on 250 Volt takes a current of 4 A when running at no load at 1000 rpm. How much back emf is generated? What will be back emf, speed if motor takes 54 Amp. At | 08 | L ₄ | CO4 |

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certain load? Arm. Resistance and field resistance are 0.2 Ohm & 250 Ohm respectively.

OR

- b) A wave wound dc shunt generator having 80 slots with 10 conductors per slot generates at no load 400 V, when running at 1000 rpm. Find out the flux per pole. If this generator is required to generate a voltage of 220 V on open circuit, at what speed it will rotate? 08 L₄ CO4
- Q.3 **Solve any Two**
- a) Draw a equivalent diagram of a single phase transformer also determine the different parameters of it. 08 L₂ CO1
- b) What is voltage regulation? Derive the expression for voltage regulation under leading pf. 08 L₂ CO2
- c) What is the need of starters in IM? Explain DOL Starter and Star Delta starter with neat sketch? 08 L₂ CO3
- d) The power input to rotor of 440 V, 50 Hz, 6 pole, 3 phase induction motor is 75 Kw. The emf induced in rotor has frequency of 1.833 Hz. Calculate (i) Slip (ii) Rotor speed (iii) rotor copper loss per phase. 08 L₂ CO4
- Q.4 **Solve any Two**
- a) Describe pitch factor and distribution factor of alternator. Explain the benefits of making short pitch coil and distribution type of winding? 09 L₄ CO5
- b) Describe merits and demerits of stationary type of armature and rotational type of rotor of alternator also explain importance of excitation? 09 L₄ CO5
- c) Derive the expression for developed torque for a 3 phase induction motor and obtain the condition for maximum torque. 09 L₄ CO5
- Q.5 **Solve any Two**
- a) Derive the emf equation of an Alternator? Explain the effect of distribution of winding and short pitch coil on magnitude of generated emf of an 09 L₄ CO6

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alternator?

- | | | | | |
|----|--|----|----------------|-----|
| b) | What is the need of parallel operation of Synchronous generators? Explain the condition of parallel operation? | 09 | L ₃ | CO6 |
| c) | What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator at (1) leading PF (2) Lagging PF. Draw the relevant Phasor Diagrams. | 09 | L ₃ | CO6 |

Q.6

Solve any Three

- | | | | | |
|----|---|----|----------------|-----|
| a) | Explain the operation of synchronous motor with constant load varying excitation with neat phasor diagrams. | 06 | L ₄ | CO5 |
| b) | What is a Synchronous condenser? What are merits and demerits of synchronous condenser over capacitor. | 06 | L ₂ | CO5 |
| c) | What is working principle of Synchronous motor? Explain the different methods to start synchronous motor? | 06 | L ₂ | CO6 |
| d) | Explain the effect of external resistance added to rotor resistance of SRIM on performance in terms of maximum torque equation? | 06 | L ₄ | CO6 |

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