Code No: R1622022 **R16** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, November - 2020
ELECTRICAL MACHINES-II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Why an Induction motor is called as rotating transformer? (2M)
   b) Comment on the variation of torque with respect to slip in three phase induction motor. (3M)
   c) Mention the applications of shaded pole motor. (2M)
   d) Compare MMF and synchronous impedance methods of estimating voltage regulation of synchronous alternator. (3M)
   e) What is synchronizing power? (2M)
   f) What are the applications of synchronous condenser. (2M)

PART –B

2. a) Explain in detail the constructional feature of wound rotor three phase induction motor. (7M)
   b) A 25 hp, 400 V, 50 Hz, 4-pole, star connected induction motor has the following impedances per phase in ohms referred to the stator side : R_s= 0.641, R'_r = 0.322: X_s=1.106, X'_r = 0.464 and X_m = 26.30. Rotational losses are assumed constant and are 1.1 kW and the core losses are assumed negligible. If the slip is 2.2% at rated voltage and frequency , find i) speed ii) stator current iii) power factor iv) output and input power and v) efficiency of motor. (7M)

3. a) Explain the no-load and blocked rotor tests and also procedure to predetermine the efficiency using circle diagram of a three phase induction motor. (7M)
   b) A three phase induction motor has a starting torque of 100% and a maximum torque of 200% of the full-load torque. Determine :
   i) slip at which maximum torque occurs
   ii) full-load torque and iii) rotor current at starting in per unit of full-load rotor current. (7M)

4. a) Explain the equivalent circuit of a single phase induction motor with neat sketch. (7M)
   b) A 230 V, 50 Hz, 4-pole single phase induction motor has the following equivalent circuit impedances referred towards stator side:
   R_{1m}= 2.2 Ω R_2' = 4.5 Ω, X_{1m} = 3.1Ω X_2' = 2.6 Ω and X_M = 80 Ω
   Friction, wind age and core loss = 40 W
   For a slip of 0.03 pu, calculate a) input current b) power factor c) developed power d) output power and e) efficiency (7M)

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5. a) Explain in detail the distributed and concentrated windings and how the performance of the machine can get affected by the windings construction. (7M)
   b) A 9 kVA, 208 V, 1200 rpm three phase, 60 Hz star-connected generator has a field winding resistance of 4.5Ω. The armature impedance is (0.3 +j0.5)Ω per phase. When the generator operates at full load and 0.8 pf lagging, the filed winding current is 5 A. Its rotational losses is 500W. Determine i) voltage regulation ii) efficiency of alternator iii) torque applied by the prime mover. (7M)

6. a) Explain the effect of increasing driving torque and speed of one of the alternators in a parallelly connected two alternators (7M)
   b) Two star –connected synchronous generators connected in parallel have an emf of 1200 V per phase share a common star-connected share impedance (2 +j1.0) Ω/phase. The synchronous impedances of the machines are Z_{s1} = 0.1+j2 Ω/phase and Z_{s2}= (0.2+j3) Ω/phase respectively. Determine the common terminal voltage, power outputs and no-load circulating current when two machines internal emfs have a phase divergence 5^0. (7M)

7. a) Describe the mathematical analysis of power developed in synchronous motor. (7M)
   b) Explain the various starting methods of synchronous motor. (7M)

Code No: RT22013 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November - 2020
STRENGTH OF MATERIALS - II
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are different failures? (4M)
   b) Write about axial couple. (3M)
   c) Write the expression for buckling load (or) Crippling load when both ends of the Columns are fixed? Explain each term. (4M)
   d) Write the conditions for stability. (4M)
   e) What are the types of beams? (3M)
   f) Write the conditions of equilibrium. (4M)

PART -B

2. In a material the principal stresses are 60 MN/m^2, 48 MN/m^2 and - 36 MN/m^2. Calculate (16M)
   (i) Total strain energy
   (ii) Volumetric strain energyP
   (iii) Shear strain energy
   (iv) Factor of safety on the total strain energy criteria if the material yields at 120 MN/m^2.
   Take E = 200 GN/m^2 and 1/m = 0.3

3. A shaft is required for transmitting a power of 60 kW running at a speed of 750 rpm. if the available shaft material has permissible shear strength of 36 N/mm^2 and rigidity modulus of 96kN.mm design a hollow shaft such that the inner diameter is 0.6 times the outer diameter. (16M)

4. A mild steel tube 4m long, 3cm internal diameter and 4mm thick is used as a strut with both ends hinged. Find the collapsing load, what will be the crippling load if (16M)
   (i) Both ends are built-in.
   (ii) One end is built-in and one end is free

5. (a) Determine stresses in case of chimney with suitable example (8+8M)
   (b) What is the core of a section. Calculate core for the rectangular section
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