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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM END TERM EXAMINATION – AUGUST 2024

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| **Semester: IV** | **Date : 05/08/2024** |
| **Course Code: EEE2017** | **Time : 1 pm to 4 pm** |
| **Course Name: Electrical Machines II** | **Max Marks :100** |
| **Program: B.Tech (EEE)** | **Weightage :50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | State the Significance of rotating magnetic field in Induction machines. | (CO1) | [Knowledge] |
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| 2 | State the operating principle of Induction Motor. | (CO1) | [Knowledge] |
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| 3 | List the parameters in the equivalent circuit of synchronous generator | (CO3) | [Knowledge] |
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| 4 | Discuss about the conditions of production of rotating magnetic field. | (CO2) | [Knowledge] |
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| 5 | Put light on the operation of synchronous machines. | (CO2) | [Knowledge] |
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| 6 | State the principle of operation of synchronous motor | (CO4) | [Knowledge] |
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| 7 | Recall the relation between electromagntic torque and slip in case of Induction Motors. | (CO2) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | The power input to a 3 phase IM is 60kW, the stator losses is 1kW. Name the different losses that can be computed from the given data if the motor is running with a slip of 3%.Compute the mechanical power developed. | (CO1) | [Comprehension] |
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| 9 | A 4 pole, 50 Hz, 3-phase, wound rotor induction motor is taking 8000 watts from the line. Stator Core loss is 240 watts, stator copper loss is 425 watts, rotor copper loss is 350 watts, friction and windage losses are 100 watts. Determine all the details that are required to find the efficiency of the Motor | (CO1) | [Comprehension] |
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| 10 | A 3 phase slip ring induction motor used for mining applications is wound for 4 poles on stator and 6 poles on rotor. When 3 phase balanced voltage source at 50 Hz is applied to the motor, explain what would happen to the operation of induction motor and why | (CO1) | [Comprehension] |
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| 11 | An alternator has been used to feed 3 phase supply to the Induction motor. The alternator comprises 4 poles and is driven at 1500 rpm using a prime mover. The induction motor consists of 6 poles and is running at a slip of 5%. Utilizing the information, comment on the speed of the rotor of the induction motor and also the speed of the magnetic field of the stator. | (CO2) | [Comprehension] |
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| 12 | After drawing the equivalent circuit of synchronous motor, explain the concept of under excited and overexcited operation of synchronous motor. | (CO4) | [Comprehension] |
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| 13 | Determine the instantaneous slip of the induction motor of slip **s** when the two of its supply leads has been suddenly interchanged. provide a brief explanation for the same. | (CO2) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | The following test results were obtained on a 7.5 kW, 400 V, 4 pole, 50 Hz, delta connected induction motor with stator resistance of 2.1 ohm/phase. The no load test data is given as 400 V, 5.3 A, 409 Watts.The Block rotor test data is 140 volts, 20 A, 1550 Watts.   1. Identify the unknown parameters that could be computed from the given data 2. Compute the unknown parameters. | (CO1) | [Application] |
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| 15 | A 400 V, 50 Hz, 6 pole delta connected, 3 phase, induction motor consumes 45 kW with a line current of 75 A and runs at a slip of 3%. If stator iron loss is 1200 kW , windage and friction loss is 900 W, and runs resistance between two stator terminals is 0.12 ohm. From the above data   1. Identify the unknown parameters that could be computed from the given data. 2. Compute the unknown parameters. | (CO2) | [Application] |
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| 16 | A 3 phase star connected alternator is rated at 1500 kVA, 12000 V. The armature effective resistance and synchronous reactance are 2 Ohm and 35 Ohm respectively per phase. After Identifying the unknown parameters that could be computed from the given data compute the unknown parameters for lagging power factor load of 0.8 and and leading power factor of 0.8. | (CO3) | [Application] |