Code No: R201214 **R20** SET - 1

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL ENGINEERING

(Com. to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit-I

1 a) Discuss with suitable diagrams different types of generators and their field of application. (7M)

b) A 4-pole dc shunt generator with lapc0nnected armature supplies a load of 100A at 200 V. The armature resistance is 0.1 Ω and the shunt field resistance is 80 Ω. Find (i) total armature current (ii) current per armature path, and (iii) emf generated. (7M)

Or

2 a) Discuss the various losses occurring in a dc shunt motor and state how each loss will vary when load on the machine is varied. (7M)

b) What is the function of starter in dc motor list out its essential parts? Give the applications of dc motors. (7M)

Unit-II

3 a) Explain briefly the principle of working of a transformer and show the voltage ratio of the primary and secondary windings is same as their turn's ratio? (7M)

b) A single phase 230V/15V, 50 Hz transformer has the secondary full load current of 8A. It has 45 turns on the secondary. Calculate (a) the voltage per turn (b) the number of primary turns (c) the full load primary current and (d) the kVA output of the transformer? (7M)

Or

4 Open-circuit and short-circuit tests on 5 kVA, 220/400 V, 50 Hz, single phase transformer gave the following results: (14M)

O.C. test	220 V,	2 A,	100 W (l.v. side)
S.C. test	40 V	11.4 A,	200 W (h.v. side)

Determine the efficiency and approximate regulation of the transformer at full load 0.9 power factor lagging?

Unit-III

5 a) Define distribution factor and derive expression for it. (7M)

b) Why is synchronous motor not self-starting? Explain its principle of working. (7M)

Or

6 a) What is synchronous impedance? How can it be measured in laboratory? (7M)

b) Draw and explain phasor diagram of synchronous motor? (7M)

Unit-IV

7 a) Compare the cage and wound 3-phase induction motors with respect to their construction and performance? (7M)

b) A 6 pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 160 N-m. When the rotor emf makes 120 complete cycles per minute. Calculate the power input, if the mechanical torque lost in friction and windage loss is 10 N-m. Also Calculate (a) the copper loss in the rotor winding (b) the efficiency. The stator loss given to be 800 W. (7M)

Or

8 a) Explain speed-torque characteristics of 3-phase induction motor and discuss the effect rotor resistance in the variation of these characteristic? (7M)

b) Calculate the speed in rpm of a 6-pole induction motor which has a slip of 6% at full load with a supply frequency of 50 Hz. What will be the speed of a 4-pole alternator supplying the motor? (7M)

Unit-V

9 Explain the principle of operation and working of ac servomotor. Draw their torque-speed characteristics. (14M)

Or

10 Explain the construction and operation of single shaded pole induction motor in detail. (14M)

Code No: R201214 **R20** SET - 2

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL ENGINEERING

(Com. to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit-I

1 a) Deduce the expression for the emf equation of dc generator for lap wound generator. (7M)

b) A 4-pole, 250 V dc long-shunt compound generator supplies a load of 10 kW at the rated voltage. The armature, series field, and shunt field resistances are 0.1 Ω, 0.15 Ω and 250 Ω respectively. The armature is lap wound with 50 slots, each slot containing 6 conductors. If the flux per pole is 50 mWb, calculate the speed of the generator. (7M)

Or

2 a) Discuss with suitable diagram Swinburne's test to find out the efficiency of a dc machine. (7M)

b) The armature of a 6-pole, 6-circuit dc shunt motor takes 300 A at the speed of 400 rpm. The flux per pole is 75 mwb. The number of armature turns is 500. Calculate (i) the torque developed by the armature, (ii) shaft torque and (iii) shaft power in kW. (7M)

Unit-II

3 a) Explain the working of transformer under load? Discus various losses occurs under load? (7M)

b) The maximum flux density in the core of 250/3000 V, 50 Hz single phase transformer is 1.2 wb per sqm. If the emf per turn is 8 volts determine primary and secondary turns and area of the core. (7M)

Or

4 a) Briefly describe about regulation and efficiency of a transformer? What are the causes for the poor regulation and efficiency? (7M)

b) Explain Sumpner's test on single phase transformer and also list its advantages? (7M)

Unit-III

5 a) Derive the e.m.f. equation for an alternator? Explain the significances of coil span and distribution factors? (7M)

b) Explain the principle of operation of a three-phase synchronous motor. (7M)

Or

6 a) Explain the principle of operation of alternator? Briefly give its constructional details? (7M)

b) State the characteristic features of a three-phase synchronous motor. (7M)

Unit-IV

7 a) Give the constructional details of wound rotor 3-phase induction motor? What are its advantages over squirrel cage rotor? (7M)

b) A 10 kW, 400 V, 3-phase, 4 pole, 50 Hz delta connected induction motor is running at no load with a line current of 8 A and an input power of 660 W. At full load, the line current is 18 A and the input power is 11.20 kW. Stator effective resistance per phase is 1.2 Ω and friction, windage loss is 420 W. For negligible rotor ohmic losses at no load, Calculate (a) Stator core loss (b) Total rotor losses at full load (c) Total rotor ohmic losses at full load (d) Full load speed. (7M)

Or

8 a) Why the starters are necessary for starting induction motors? List the different starting methods? (7M)

b) The voltage applied to the stator of a 3-phase, 4-pole induction motor has a frequency of 50 Hz. The frequency of the emf induced in the rotor is 2 Hz. Calculate the slip and speed at which motor is running. If the supply frequency is made as 60 hz and maintaining same rotor emf frequency what will be the slip and speed of the motor. (7M)

Unit-V

9 Draw the circuit diagram of capacitor-start capacitor-run single phase induction motor and explain its working. Where this type of motor is commonly used? (14M)

Or

10 a) Explain the constructional features and principle operation of a single phase induction motor (7M)

b) Give the constructional details and working of ac servo motor. (7M)

Code No: R201214 **R20** SET - 3

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL ENGINEERING

(Com. to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit-I

1 a) Derive the emf equation of a dc generator. (7M)

b) An 8-pole lap wound dc generator has 1000 armature conductors, flux of 20 m Wb per pole and emf generated is 400 V. What is the speed of the machine? (7M)

Or

2 a) Describe in details the methods of speed control of dc shunt motor. (7M)

b) A 220 V series motor takes 10 A and runs at 600 rpm. The total resistance is 0.8 Ω. At what speed will it run, when a 5 Ω resistance is connected in series, the motor taking the same current at the same supply voltage. (7M)

Unit-II

3 a) With a neat schematic diagram, explain the principle of operation of a Single-phase transformer. (7M)

b) Find the cross-sectional area of the core of a 10 turns transformer for a voltage of 50 V at 50 Hz. The flux density is 0.9 Wb/m^2. (7M)

Or

4 a) Define the term regulation of a transformer and give the expression for it with relevant explanation. (7M)

b) A single-phase transformer supplies a load of 20 kVA at a power factor of 0.82 (lagging). The iron loss of the transformer is 200 W and the copper losses at this load is 180 W. Calculate the efficiency. (7M)

Unit-III

5 a) Explain the constructional aspects of a Synchronous machine. (7M)

b) A 440 V, three-phase alternator, running at rated speed, has a 2 A excitation current when short circuit is applied at its terminals. The short circuit magnitude is 50 A (full load current). At this excitation the open circuit voltage is 150 V/phase. Assuming the armature circuit resistance to be 0.5 Ω per phase, obtain the value of regulation of the alternator at 0.8 power factor lagging load. (7M)

Or

6 a) List out the specific advantages of Distributed armature winding in a synchronous machine. (7M)

b) Draw and explain the equivalent circuit of a Synchronous motor. (7M)

Unit-IV

7 a) Draw and explain the Torque slip characteristics of a three-phase induction motor. (7M)

b) A 10-pole induction motor is supplied by a 6-pole alternator, which is driven at 1400 rpm. If the motor runs with a slip of 2%, what is its speed? (7M)

Or

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8 a) List the advantages and disadvantages of a Three phase induction motor. (7M)

b) A three-phase, 5 HP, 400 V, 50 Hz induction motor is working at full load with an efficiency of 85 % at a power factor of 0.8 lagging. Calculate: (i) the input power and (ii) the line current. (7M)

Unit-V

9 a) Explain the operation of a single-phase induction motor on the basis of double revolving field. (7M)

b) Explain with a neat circuit diagram the working of Capacitor start induction motor. (7M)

Or

10 a) Discuss the differences between capacitor start, capacitor start capacitor run and permanent split capacitor motors. (8M)

b) List the applications of Split phase induction motors, capacitor motors, and Capacitor start capacitor run motor. (6M)

Code No: R201214 **R20** SET - 4

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL ENGINEERING

(Com. to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit-I

1 a) Draw a neat sketch of a dc machine showing the different parts. State the function of each part. (7M)

b) The armature of a 4-pole 230 V wave wound generator has 400 conductors and runs at 400 rpm. Calculate the useful flux per pole. (7M)

Or

2 a) Derive the equation of torque for a dc motor. (7M)

b) A 480 V, 20 kW shunt motor takes 2.5 A when running at no load. Taking the armature resistance to be 0.6 Ω, field resistance to be 800 Ω and brush drop 2 V, find the full load efficiency. (7M)

Unit-II

3 a) Explain the constructional aspects of a Single – phase transformer and also distinguish between a step- up and a step-down transformer. (7M)

b) A 200 kVA single-phase transformer has 1000 turns in the primary and 600 turns on the secondary. The primary winding is supplied from a 440 V, 50 Hz source. Find the (i) secondary voltage at no load and (ii) primary and secondary currents at the full load. (7M)

Or

4 a) Explain the working of transformer under no – load and lagging Load conditions with relevant phasor diagrams. (7M)

b) A 8 kVA, 440/2000 V, 50 Hz single-phase transformer gave the following test results: (7M)
No load test: 440 V, 0.8 A, 80 W.
Short circuit test: 50 V, 3 A, 20 W.
Calculate the efficiency on full load at 0.85 lagging power factor.

Unit-III

5 a) Explain how a synchronous machine can be used / realized as an alternator and as a synchronous motor. (7M)

b) A three-phase, 50 Hz. Alternator has 90 turns per phase. The flux per pole is 0.1 weber. Calculate (i) the emf induced per phase and (ii) emf between the line terminals with star connection. Take distribution factor equal to 0.96 and assume full pitch winding. (7M)

Or

6 a) Derive the expression for frequency of an alternator. (7M)

b) Explain the principle of operation of a synchronous motor. (7M)

Unit-IV

7 a) Distinguish in detail between Squirrel cage Induction motor and Phase Wound Induction motor. (7M)

b) The voltage applied to the stator of a three-phase, 4-pole induction motor has a frequency of 50 Hz. The frequency of the emf induced in the rotor is 1.5 Hz. Determine slip and speed at which motor is running. (7M)

Or

8 a) Explain the concept of Slip and why it is a very useful quantity in studying induction motors. (7M)

b) Explain how the No – load test and Blocked rotor test are performed to determine the efficiency of a three-phase induction motor. (7M)

Unit-V

9 a) A three-phase induction motor develops a starting torque, but a single phase induction motor does not. Why? (7M)

b) Explain the working of Capacitor start capacitor run motor with a neat diagram. (7M)

Or

10 a) Discuss the procedure to determine the parameters of an equivalent circuit of a single-phase induction motor. (7M)

b) Explain the constructional aspects of the AC servo motor and also give its applications. (7M)