

Code No: 07A3EC13

R07**Set No. 2****II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010****ELECTRICAL TECHNOLOGY**

Common to BME, ICE, E.COMP.E, ETM, E.CONT.E, EIE, ECE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Explain the working of a 1- ϕ transformer:
 - i. on no-load and
 - ii. when supplying lagging p.f load with relevant phasor diagram.
 (b) Describe the different constructional parts of transformer. [8+8]
2. (a) What is the basic principle of an alternator?
 (b) Derive the e.m.f. equation of an alternator. [8+8]
3. (a) Explain with the help of diagrams how a rotating magnetic field is produced in the air gap of a 3-phase induction motor.
 (b) An 8pole 3phase alternator is coupled to an engine running at 750rpm. The alternator supplies power to an induction motor, which has a full load speed of 1425 rpm. Find the percentage slip and the number of poles of the motor. [8+8]
4. How is the current range of PMMC instruments extended with the help of shunts? Describe a method of reducing errors due to temperature changes in the shunt connected instruments. Illustrate with an example. [16]
5. (a) With a neat sketch explain the operation of AC servo motors with their torque speed characteristics.
 (b) How is the AC 1- ϕ motor made self starting?
 (c) What are the types of windings that are used in split phase motor? [8+4+4]
6. (a) Explain flux control method of speed control of dc shunt motor.
 (b) A dc shunt motor takes an armature current of 50 A at its rated voltage of 240 V. Its armature circuit resistance is 0.2 ohms. If an external resistance of 1 ohm is inserted in series with the armature and the field flux remains unchanged, calculate:
 - i. % decrease or increase in speed for the same load torque and
 - ii. % decrease or increase in speed for half of the load torque.
 [8+8]
7. (a) Explain the internal and external characteristics of dc series generator.

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(b) A series generator, having an external characteristic which is a straight line through zero to 50V at 200 A, is connected as a booster between a station bus bar and a feeder of 0.2 ohm resistance. Calculate the voltage between the far end of the feeder and the bus bar at a current of

i. 160A and

ii. 50A.

[8+8]

8. A 1000V, 25 Hz, 100kVA transformer has copper, hysteresis and eddy current losses of 1.5, 0.7 and 0.4% of output. What will be the percentage losses if transformer is used on 2000V, 50Hz system, assuming the full load current to be the same in the two cases? Compare the full load efficiency at the two frequencies if p.f is unity and 0.8 lagging. [16]

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1. (a) Explain the internal and external characteristics of dc series generator.
 (b) A series generator, having an external characteristic which is a straight line through zero to 50V at 200 A, is connected as a booster between a station bus bar and a feeder of 0.2 ohm resistance. Calculate the voltage between the far end of the feeder and the bus bar at a current of
 - i. 160A and
 - ii. 50A.[8+8]
2. How is the current range of PMMC instruments extended with the help of shunts? Describe a method of reducing errors due to temperature changes in the shunt connected instruments. Illustrate with an example. [16]
3. (a) With a neat sketch explain the operation of AC servo motors with their torque speed characteristics.
 (b) How is the AC 1- ϕ motor made self starting?
 (c) What are the types of windings that are used in split phase motor? [8+4+4]
4. (a) What is the basic principle of an alternator?
 (b) Derive the e.m.f. equation of an alternator. [8+8]
5. (a) Explain flux control method of speed control of dc shunt motor.
 (b) A dc shunt motor takes an armature current of 50 A at its rated voltage of 240 V. Its armature circuit resistance is 0.2 ohms. If an external resistance of 1 ohm is inserted in series with the armature and the field flux remains unchanged, calculate:
 - i. % decrease or increase in speed for the same load torque and
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6. (a) Explain the working of a 1- ϕ transformer:
 - i. on no-load and
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 (b) Describe the different constructional parts of transformer. [8+8]

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7. A 1000V, 25 Hz, 100kVA transformer has copper, hysteresis and eddy current losses of 1.5, 0.7 and 0.4% of output. What will be the percentage losses if transformer is used on 2000V, 50Hz system, assuming the full load current to be the same in the two cases? Compare the full load efficiency at the two frequencies if p.f is unity and 0.8 lagging. [16]
8. (a) Explain with the help of diagrams how a rotating magnetic field is produced in the air gap of a 3-phase induction motor.
- (b) An 8pole 3phase alternator is coupled to an engine running at 750rpm. The alternator supplies power to an induction motor, which has a full load speed of 1425 rpm. Find the percentage slip and the number of poles of the motor. [8+8]

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 (b) A dc shunt motor takes an armature current of 50 A at its rated voltage of 240 V. Its armature circuit resistance is 0.2 ohms. If an external resistance of 1 ohm is inserted in series with the armature and the field flux remains unchanged, calculate:
 - i. % decrease or increase in speed for the same load torque and
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2. A 1000V, 25 Hz, 100kVA transformer has copper, hysteresis and eddy current losses of 1.5, 0.7 and 0.4% of output. What will be the percentage losses if transformer is used on 2000V, 50Hz system, assuming the full load current to be the same in the two cases? Compare the full load efficiency at the two frequencies if p.f is unity and 0.8 lagging.

[16]
3. (a) What is the basic principle of an alternator?
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[8+8]
5. (a) Explain with the help of diagrams how a rotating magnetic field is produced in the air gap of a 3-phase induction motor.
 (b) An 8pole 3phase alternator is coupled to an engine running at 750rpm. The alternator supplies power to an induction motor, which has a full load speed of 1425 rpm. Find the percentage slip and the number of poles of the motor.

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6. How is the current range of PMMC instruments extended with the help of shunts? Describe a method of reducing errors due to temperature changes in the shunt connected instruments. Illustrate with an example.

[16]

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7. (a) With a neat sketch explain the operation of AC servo motors with their torque speed characteristics.
- (b) How is the AC 1- ϕ motor made self starting?
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- i. on no-load and
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- (b) Describe the different constructional parts of transformer. [8+8]

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- (b) How is the AC 1- ϕ motor made self starting?
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