

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2017

Subject Code: 2131005

Date: 29/11/2017

Subject Name: Electrical Machines

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Derive EMF equation of single-phase transformer. **03**
(b) State conditions for parallel operation of two transformers. **04**
(c) Explain O.C. and S.C. test on single-phase transformer. **07**
- Q.2** (a) Discuss the principle of operation of 3-phase induction motor. **03**
(b) Explain power stages of an induction motor. **04**
(c) Draw and explain torque-speed characteristic of 3-phase induction motor. **07**
- OR**
- (c) Discuss speed control methods of 3-phase induction motor. **07**
- Q.3** (a) Why 1-phase induction motor is not self-starting? **03**
(b) State types of single-phase induction motor and explain any one. **04**
(c) Explain pitch factor and distribution factor for an alternator. **07**
- OR**
- Q.3** (a) Derive EMF equation of an alternator. **03**
(b) State advantages of stationary armature in an alternator. **04**
(c) Explain synchronous impedance method for finding voltage regulation of alternator. **07**
- Q.4** (a) Explain action of commutator in d.c. generator. **03**
(b) A long shunt compound generator delivers a load current of 50A at 500V. It has armature, series field and shunt field resistances are 0.05 Ω , 0.03 Ω and 250 Ω respectively. Find armature current and generated voltage. Neglect brush voltage drop. **04**
(c) Describe armature control and flux control method for speed control of d.c. shunt motor. **07**
- OR**
- Q.4** (a) Explain working principle of d.c. motor. **03**
(b) A 4-pole, 3-phase induction motor operates at supply of frequency 50 Hz. Find synchronous speed and rotor speed of the motor when slip is 0.04. **04**
(c) Explain armature reaction in d.c. generator. **07**
- Q.5** (a) Write a short note on Ferranti effect. **03**
(b) Explain 3-phase 4-wire distribution system. **04**
(c) Explain block diagram of Nuclear Power Station. **07**
- OR**
- Q.5** (a) Write function of super heater, economizer and ID fan. **03**
(b) Discuss load factor and diversity factor. **04**
(c) Explain methods of starting of synchronous motor. **07**
