

I B. Tech II Semester Supplementary Examinations, November - 2019
ELECTRICAL AND MECHANICAL TECHNOLOGY
 (Com. to ECE, EIE, E Com E)

Time: 3 hours

Max. Marks: 70

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

PART -A

1. a) Why is the low voltage winding is placed near the core in a transformer? (2M)
- b) Mention the different types of dc generators. (2M)
- c) Deduce a relationship between rotor current frequency and supply frequency in terms of slip. (2M)
- d) What are the differences between Moving coil and Moving iron instruments? (2M)
- e) Define indicated power, brake power and friction power. (2M)
- f) What is laminar flow and turbulent flow? (2M)
- g) Define brazing and soldering. (2M)

PART -B

2. a) Explain the operation of a three-point starter with the help of a neat schematic diagram. (7M)
- b) Discuss about different losses that occur in a transformer and write an expression for its efficiency. (7M)
3. a) Explain how torque is produced in a three-phase induction motor. Draw the slip-torque characteristics. (7M)
- b) A 3-phase, 3.3 kV star-connected alternator can supply a full-load current of 90 A. Its per phase armature resistance is 0.9Ω . Under short-circuit condition it takes 5 A field current to produce full-load short-circuit current. The e.m.f. on open circuit for the same excitation is 850 V (line-to-line). Determine synchronous reactance per phase and regulation for (i) 0.9 p.f. lagging, (ii) 0.9 p.f. leading. (7M)
4. a) What are the various techniques by which damping torque is produced in an electrical measuring instrument? Explain them. (8M)
- b) A single-phase energy meter has a constant of 1200 rev./kWh. When a load of 200 W is connected the disc rotates at 4.2 r.p.m. If the load is on for 10 hours, how many units are recorded as error? Also find the percentage error. (6M)
5. a) Compare Otto cycle, Diesel cycle and Dual cycle based on (i) Same compression ratio, (ii) same maximum pressure and temperature. (7M)

- b) In an air standard Otto cycle, the compression ratio is 7 and the compression begins at 35°C and 0.1 MPa. The maximum temperature of the cycle is 1100°C . (7M)
Find (i) the temperature and the pressure at various points in the cycle,
(ii) the heat supplied per kg of air,
(iii) work done per kg of air, (iv) the cycle efficiency.
Take C_v for air as 0.718 kJ/kg K.
6. a) Explain the modes of heat transfer with examples. (6M)
b) Differentiate between natural and forced convection. (4M)
c) Discuss about black body and grey body. (4M)
7. a) Two parallel shafts, whose centre lines are 4.8 m apart, are connected by open belt drive. The diameter of the larger pulley is 1.5 m and that of smaller pulley 1 m. The initial tension in the belt when stationary is 3 kN. The mass of the belt is 1.5 kg / m length. The coefficient of friction between the belt and the pulley is 0.3. Taking centrifugal tension into account, calculate the power transmitted, when the smaller pulley rotates at 400 r.p.m. (7M)
- b) With a neat sketch explain arc welding process. (7M)