Code No: R161214 **R16** SET - 1

**I B. Tech II Semester Supplementary Examinations, July/August - 2021**
**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**

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## PART –A

1. a) Explain why DC motors should require starters. (2M)

   b) What is meant by slip of an induction motor? What is the value of slip at starting and at synchronous speed? (3M)

   c) Explain how the range of a voltmeter can be extended. (2M)

   d) What is the main difference between 2 stroke and 4 stroke engine? (2M)

   e) Define Black body and Grey body. (3M)

   f) Explain the principle of arc welding process? (2M)

## PART -B

2. a) Draw the connection diagrams for dc shunt, series and compound motors. (7M)

   b) A 25 kVA, 2000/200 V transformer has iron loss of 350 W and full-load copper loss of 400 W. Calculate the efficiency of the transformer at full load and at half load 0.8 power factor lagging. (7M)

3. a) Derive an expression for torque developed by an induction motor and draw torque-speed characteristic from it. (7M)

   b) A 1500 kVA, 3300 V, 50 Hz, three-phase, star-connected synchronous generator has an armature resistance of 0.2 Ω per phase. A field current of 50 A produces a short-circuit current of 262 A and an open-circuit EMF of 1200 V between the lines. Calculate voltage regulation of the generator on full load at 0.8 power factor lagging. (7M)

4. a) Explain the constructional details and working principle of a single-phase induction type energy meter. (7M)

   b) Explain how power measurement is done using electrodynamometer type wattmeter. (7M)

5. a) Write a brief note on Thermodynamic principles and laws. (7M)

   b) Explain with suitable sketches the working of four-stroke diesel engine. (7M)

6. a) Explain the effect of extended surfaces on heat transfer. Discuss in detail the classification of fins with neat sketches. (7M)

   b) A cubical tank of water of volume 1 $m^3$ is kept at a steady temperature of $65^0$C by a 1 kW heater. The heater is switched off. How long does the tank take to cool to $50^0$C, if the room temperature is $15^0$C? (7M)
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7. a) Explain the causes of welding defects and their remedies with neat sketch. (7M)

   b) What do you mean by crossed belt drive? Find the length of belt in crossed belt drive. (7M)