

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE III SEMESTER EXAMINATION IN MARINE ENGINEERING DECEMBER 2020

19-208-0302 ELECTRICAL TECHNOLOGY (2019 Scheme)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet]

Max. Marks: 8

INSTRUCTIONS

1. You have to be available in Google Meet Video Camera throughout the examination hours.
2. You have to share your 'live location' to the faculty before uploading the answer sheet of Module I.
3. You have to answer only one question.
4. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
5. If at all an answer goes beyond one page, (due to your handwriting) another page can also be used. In such a situation, the page number should be given as 1/2, 2/2.
6. You have to put the Question Number correctly.
7. After answering the question, you have to scan in pdf format and upload the answer page in a format of <reg. no.><module/group no.><question no.>.pdf.

MODULE - I

(Answer **ANY ONE** question)

- I(1). (a) What are the various tests that give the complete parameters of the equivalent circuit of a transformer? (4)
- (b) The voltage per turn of a single-phase transformer is 1.1 V. When the primary winding is connected to a 220 V, 50 Hz A.C supply, the secondary voltage is found to be 550 V. Find : (4)
- (i) Primary and secondary turns.
 - (ii) Core area if the maximum flux density is 1.1T.
- OR**
- I(2). (a) Sketch the phasor diagram of a transformer at leading power factor. (4)
- (b) In a 50 kVA, 11 kV / 400 V transformer, the iron and copper losses are 500 W and 600 W respectively under the rated conditions. (4)
- (i) Calculate the efficiency on unity power factor at full load.
 - (ii) Find the load for maximum efficiency and the iron and copper losses corresponding to this.

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MODULE - II

(Answer *ANY ONE* question)

- II(1). (a) Sketch and explain the working of a three point starter. (4)
- (b) A long shunt D.C compound generator has an armature, series field and shunt field resistance of 0.04Ω , 0.03Ω and 200Ω respectively. It supplies a load current of 180A at 400V. Calculate, generated e.m.f. Assume contact drop/brush = 1V. (4)

OR

- II(2). (a) Mention the functions and materials of the following parts of a D.C machine: (4)
- (i) Field poles (ii) yoke (iii) commutator (iv) armature.
- (b) A 230 V D.C shunt motor takes 32 A at full load. Find the back e.m.f on full load if the resistance of motor armature and shunt field windings are 0.2Ω and 115Ω respectively. (4)

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MODULE - III

(Answer *ANY ONE* question)

- III(1). (a) Sketch the torque-slip characteristics of three phase induction motor and explain. (4)
(b) The power input to the rotor of a 400V,50Hz, 3-phase induction motor is 50 kW. The rotor emf makes 120 cycles per minute. Friction and windage losses are 2 kW. Calculate
(i) slip (ii) rotor speed (iii) rotor copper loss (iv) mechanical power developed. (4)
- OR**
- III(2). (a) Write short note on star-delta starter. (4)
(b) Explain the different starting methods of single- phase induction motor. (4)

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MODULE - IV

(Answer *ANY ONE* question)

- IV(1). (a) Derive the emf equation of an alternator. (4)
(b) Why are alternators connected in parallel? What are the conditions for paralleling alternators? (3)

OR

- IV(2). Calculate the speed and open-circuit line and phase voltages of a 4-pole, 3 phase, 50 Hz star-connected alternator with 36 slots and 30 conductors per slot. The flux per pole is 0.05 Wb sinusoidally distributed. Assume coils to be full-pitched. (7)

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MODULE - V

(Answer **ANY ONE** question)

- V(1). (a) What is meant by hunting in a synchronous motor? What are the causes of hunting in synchronous machines? (4)
- (b) Explain any one method of starting synchronous motor. (3)

OR

- V(2). Explain V and inverted V curves of synchronous motor in detail. (7)
