COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE III SEMESTER REGULAR 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. Those students who are not present through Google Meet Video Camera will not be permitted to write the online examination.
3. You have to share your '**live location**' to the faculty before uploading the answer sheet.
4. You have to answer only one question.
5. You have to write register number, subject code and module/group number (as given in the question paper) in each page.
6. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
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MODULE - I
(Answer *ANY ONE* question)

I(1). (a) (i) Find the number of H.V and L.V turns per phase. (3)

           (ii) emf per turn of a three phase, 50 Hz, 11000/550 V delta/star, 300 kVA, core type transformer, which operates with a flux of 0.04 wb.

    (b) Explain with circuit diagrams, the tests to be carried out in laboratory for the determination of parameters of single phase transformer. (5)

OR

I(2). (a) State and prove the condition for maximum efficiency of a transformer. (5)

    (b) A 1000 kVA, 110/220 V, 50 Hz, single-phase transformer has an efficiency of 98.3% at half full-load at 0.8 pf leading and 98.7% at full load unity power factor. Calculate (i) iron loss (ii) full load copper loss. (3)

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MODULE - II
(Answer *ANY ONE* question)

II(1).   (a)   A shunt generator delivers 195 A at terminal voltage of 250 V. The armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and frictional losses equal 950 W. Find   (4)

      (i)   emf generated

      (ii)   copper losses

      (iii)   output of the prime mover

      (iv)   commercial efficiency

    (b)   Explain the performance curve of a high starting torque D.C motor.   (4)

OR

II(2).   (a)   Sketch and explain a 3-point starter.   (5)

    (b)   Give reason for the following: (3)

      (i)   Why are series generators not used for power supply?

      (ii)   Why shunt generators are used for ordinary lighting and power supply?

      (iii)   Why are swinburne's test called as convenient and economical test?

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MODULE - III
(Answer *ANY ONE* question)

III(1).	(a)	Sketch and explain a star-delta starter.	(4)
	(b)	If the supply frequency of a 3 phase, 4 pole induction motor is 50 Hz. Calculate:	(4)

    (i)   Speed at which the magnetic field of the stator is rotating

    (ii)   rotor speed when the slip is 0.05

    (iii)   frequency of rotor current at standstill

    (iv)   frequency of rotor current when slip is 0.03

OR

III(2).	(a)	A 6 pole, 3-phase induction motor of 440V ,50Hz has 87 kW as power input to the rotor. The rotor electromotive force is observed to make 100 complete cycles per minute. Calculate:	(3)

    (i)   the slip

    (ii)   the rotor speed

    (iii)   rotor copper losses per phase

	(b)	Explain capacitor start-capacitor run induction motor. How would you reverse the direction of rotation of this single- phase induction motor?	(5)

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MODULE - IV
(Answer *ANY ONE* question)

IV(1).   (a)   Find the frequency, the phase and line voltages of a 3-phase, 16-pole alternator (star connected) with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb, sinusoidally distributed and speed is 375 rpm. Assume coils are full pitched.   (4)

       (b)   Why are alternators connected in parallel? What are the conditions for paralleling alternators?   (3)

OR

IV(2).   (a)   Draw the phasor diagrams of an alternator at unity, lagging and leading pf.   (6)

       (b)   Define short circuit ratio of an alternator.   (1)

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MODULE - V
(Answer *ANY ONE* question)

V(1).   Prove that, the resultant flux of a synchronous motor is of constant magnitude and does not change with time 't'.   (7)

OR

V(2).   (a) What is hunting and what are the causes of hunting in synchronous machines?   (4)

(b) Explain V- curve in synchronous motor.   (3)

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