Q. Code:827977

Reg. No. | | | | | | | | | | | | | |

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

EE22451 – MARINE ELECTRICAL MACHINES II

(Electrical and Electronics Engineering)

(Regulation2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Identify the measuring instruments and control system for marine application.	**2**
CO 2	Analyze the performance characteristics of Alternators.	**4**
CO 3	Understand the principles of operation and construction details of synchronous Motor.	**2**
CO 4	Analyze the principles of operation, construction details and performance of induction motor.	**4**
CO 5	Analyze the speed control methods and trouble shooting in induction motor.	**4**

PART- A(20x2=40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Portray the circuit diagram of the V-I and P-I converter using op-amp.	**1**	**2**
2.	When is an AC bridge said to be balanced? State the conditions?	**1**	**2**
3.	Identify the functional components of automatic control system.	**1**	**2**
4.	How to improve power factor?	**1**	**3**
5.	Generators No.l and 2 are operating in parallel and prime mover of generator No.2 suffers a total fuel loss - the consequence is?	**2**	**4**
6.	Is the ship's alternator Star wound or Delta wound and why?	**2**	**4**
7.	What is a brushless alternator?	**2**	**2**
8.	Is the rotating field or stationary field alternator more advantageous? Justify	**2**	**4**
9.	What is a synchronous condenser? Where and why is it used?	**3**	**2**
10.	What are the main characteristics of a synchronous motor?	**3**	**2**
11.	Why damper windings are used in synchronous motor?	**3**	**4**
12.	What is the effect on speed if the load is increased on a 3 phase synchronous motor?	**3**	**2**
13.	Describe why an induction motor is called a 'rotating transformer'.	**4**	**2**
14.	Why Induction motor is called asynchronous motor?	**4**	**4**
15.	A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system.	**4**	**3**

Calculate the speed at which the magnetic field of the stator is rotating.

16.	Describe how do change in supply voltage and frequency affect the performance of a 3 phase induction motor.	**4**	**3**
17.	Express the relationship between staring torque and full load torque of DOL Starter?	**5**	**2**
18.	What happens when 50Hz induction motor made to run at 60Hz?	**5**	**2**
19.	Identify the types of single phase induction motor.	**5**	**2**
20.	Point out the two advantages of speed control of induction motor by injecting an EMF in the rotor circuit.	**5**	**2**

PART- B (5x 10=50Marks)

		Marks	CO	RBT LEVEL
21. (a)	Describe the Murray loop Test to find the location of short circuit in Cable.	**(10)**	**1**	**3**
	(OR)			
(b)	Discuss the working of single phase Electrodynamometer type power factor meter, with neat circuit diagram.	**(10)**	**1**	**3**
22. (a)	State the conditions necessary for paralleling alternators. Explain one dark and two bright lamp methods with necessary electrical circuit diagram.	**(10)**	**2**	**3**
	(OR)			
(b)	A 3 Phase, 8 Pole, Star connected alternator has the armature coils short chorded by one slot. The coil span is 1650 electrical. The alternator is driven at the speed of 750 rpm. If there are 12 conductors per slot and flux per pole is 50 mwb, calculate the induced line and phase voltages.	**(10)**	**2**	**3**
23. (a)	Why is synchronous motor not self starting? What methods are generally used to start the synchronous motors?	**(10)**	**3**	**3**
	(OR)			
(b)	State the applications of synchronous motors. Compare synchronous motor with induction motor drives.	**(10)**	**3**	**3**
24. (a)	**(i)** Explain how rotating magnetic field is produced in three phase winding with three phase supply.	**(5)**	**4**	**3**

(ii)	A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate (i) Speed at which the magnetic field of the stator is rotating, (ii) Speed of the rotor when the slip is 0.04, (iii) The frequency of the rotor current when the slip is 0.03.	**(5)**	**4**	**3**
	(OR)			
(b)	Derive the expression for torque under running condition of a 3-phase induction motor and obtain the condition for maximum torque. Sketch the torque slip characteristics of 3 phase cage and slip-ring induction motors.	**(10)**	**4**	**3**
25. (a)	Describe the following: (i) Rotor Resistance Starter for Starting Slipring Induction Motor. (ii) Speed Control of an induction motor by changing the frequency and Poles.	**(10)**	**5**	**3**
	(OR)			
(b)	Explain the following methods of speed control scheme of an induction motor (i) Cascaded connection. (ii) V/f Control.	**(10)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	The ratio of maximum torque to full load torque in a 3 phase squirrel cage induction motor is 2.5:1. Evaluate the ratio of actual torque to full load torque for the following cases: (i) Direct starting (ii) Star delta Starting (iii) Autotransformer starting having voltage per phase at starting as 65% of supply. The rotor resistance and reactance per phase are 0.4 ohm and 4 ohm, respectively.	**(10)**	**5**	**5**

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