Q. Code:976666

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

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

Fifth Semester

EE18551 – MARINE ELECTRICAL MACHINES –II

(Electrical and Electronics Engineering)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	The Measurement of power and method of finding cable faults.	**4**
CO 2	The procedure for producing electricity on board ships through alternators, Design features of Alternators – their construction , operation and associated controls.	**5**
CO 3	Principles of operation and construction details of synchronous motors, induction machines.	**5**
CO 4	Speed control and trouble shooting in induction machines.	**4**

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How do you measure the magnetic flux density?	**1**	**2**
2.	Compare open loop and closed loop control systems.	**1**	**2**
3.	What is the need for parallel operation of alternators?	**2**	**2**
4.	Identify the distribution factors of an alternator with concentrated winding.	**2**	**2**
5.	Why a 3-phase synchronous motor fails to start?	**3**	**4**
6.	How the synchronous motor can be used for power factor improvement?	**3**	**2**
7.	When an induction motor behaves as an induction Generator?	**3**	**2**
8.	List the types of 3-phase induction motor and discuss the salient features.	**3**	**1**
9.	What happens to a 3 phase induction motor one phase fails during starting?	**4**	**1**
10.	Why do induction motors have better speed control than synchronous machines?	**4**	**4**

PART- B (5x 14=70Marks)

			Marks	CO	RBT LEVEL
11. (a)		Sketch and describe an induction type wattmeter and how two wattmeters can be used to measure a 3 phase power?	**(14)**	**1**	**3**
		(OR)			
(b)	**(i)**	Describe construction, operation of Megger and its applications.	**(7)**	**1**	**3**
	(ii)	Explain the Automatic control system with necessary block diagram?	**(7)**	**1**	**3**
12. (a)	**(i)**	With neat sketch, describe the construction and principle of operation of salient pole alternator.	**(7)**	**2**	**3**

	(ii)	Explain 3 dark lamp synchronization methods for an alternator with neat diagram.	**(7)**	**2**	**3**
		(OR)			
	(b)	A 3300V, 3phase star connected alternator has a full load current of 100A. On short circuit a field current of 5A was necessary to produce full load current. The EMF on open circuit for the same excitation was 900V. The armature resistance was 0.8Ω/phase. Determine the full load voltage regulation for (i) 0.8 PF lagging (ii) 0.8 PF leading	**(14)**	**2**	**3**
13.	**(a)**	Explain briefly the principle of action of three phase synchronous motor, and describe with aid of vector diagram the effect of varying the excitation, the input power remains constant?	**(14)**	**3**	**3**
		(OR)			
	(b)	Illustrate the following phenomenon in a synchronous motor (i) Hunting of synchronous motor. (ii) Synchronous condenser.	**(14)**	**3**	**3**
14.	**(a)**	**(i)** Explain working principle of three phase induction motor? What are the various types of rotor?	**(7)**	**3**	**3**
		(ii) Explain how rotating magnetic field is produced in three phase windings with three phase supply?	**(7)**	**3**	**3**
		(OR)			
	(b)	**(i)** Portray the Torque-Slip characteristics of 3 phase induction motor during Motoring, Generating and Breaking mode of operation.	**(7)**	**3**	**3**
		(ii) Derive the torque developed by an Induction Motor during starting and running conditions.	**(7)**	**3**	**3**
15.	**(a)**	Examine the different methods by which speed control of induction motors is achieved.	**(14)**	**4**	**4**
		(OR)			
	(b)	The direct online start of squirrel cage motor is used for most electrical drives on A.C. powered ships. Describe with sketches as necessary one method of overcoming each of the following Problems (i) High starting current (ii) Low starting torque.	**(14)**	**4**	**4**

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

			Marks	CO	RBT LEVEL
16.		A 440-V, 3- φ, 50-Hz, 4-pole, Y-connected induction motor has a full-load speed of 1425 rpm. The rotor has an impedance of (0.4 + j 4) ohm and rotor/stator turn ratio of 0.8. Evaluate (i) Full-load torque (ii) Rotor current and full-load rotor Cu loss (iii) Power output if windage and friction losses amount to 500 W (iv) Maximum torque and the speed at which it occurs (v) Starting current and (vi) Starting torque.	**(10)**	**3**	**5**

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