Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Engineering
End Sem Examination May-2023
RA3CO21 Electrical Machines & Power Systems

Programme: B.Tech. Branch/Specialisation: RA

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. The transformer ratings are usually expressed in terms of- **1**
(a) Volts (b) Amperes (c) kW (d) kVA

ii. A transformer core is laminated to- **1**
(a) Reduce hysteresis loss (b) Reduce eddy current losses
(c) Reduce copper losses (d) Reduce all above losses

iii. DC motors are generally designed to have maximum efficiency at- **1**
(a) Full load (b) Near full load
(c) Half load (d) Near half load

iv. When quick speed reversal is required, the motor preferred is- **1**
(a) Synchronous motor
(b) Squirrel cage induction motor
(c) Wound rotor induction motor
(d) DC motor

v. Speed of a repulsion motor at no load is- **1**
(a) Low (b) Very low (c) High (d) Dangerously high

vi. In a 3-phase slip ring induction motor, the rotor winding terminals are brought out through slip rings to- **1**
(a) Connect extra resistance across them during starting
(b) Connect them either in star or in delta as per need
(c) Connect to 3-phase ac supply
(d) Close the rotor circuit externally

vii. A stepper motor is- **1**
(a) A dc motor (b) A single-phase ac motor
(c) A two-phase motor (d) A multi-phase motor

viii. Servomotor has _____ terminals. **1**
(a) Two (b) Three (c) Four (d) Six

P.T.O.

ix. Which of the following materials is not used for transmission and distribution of electric power? **1**
(a) Copper (b) Aluminium (c) Tungsten (d) Steel

x. Which of the following is generally used as a moderator in nuclear power plants? **1**
(a) Graphite (b) Heavy water
(c) Concrete (d) Graphite & concrete

Q.2 i. Derive the emf equation of single-phase transformer. **3**
ii. Explain the various connection of three phase transformer. **7**
OR iii. The efficiency of a 400 KVA single phase transformer is 98.77%, when delivering full load at 0.8 pf and 99.13%, when delivering half load at unity pf. Calculate: (a) Iron loss (b) Copper loss. **7**

Q.3 i. What is back emf? Explain its significance. **3**
ii. Explain the basic constructional features of D.C. machine with neat diagram. **7**
OR iii. Illustrate the torque-speed characteristics of DC shunt and series motors. **7**

Q.4 i. Explain how the rotating magnetic field is produced when a three-phase supply is given to induction motor. **3**
ii. What methods are applied to single phase induction motor for starting? Explain in detail. **7**
OR iii. Illustrate the various starting methods needed for starting of three phase induction motor. **7**

Q.5 i. Illustrate the different modes of excitation of stepper motors. **3**
ii. Explain the principle of operation of DC servomotor. Also write its application. **7**
OR iii. Explain the principle of operation of BLDC motor. How speed of BLDC motor is controlled? Explain in brief. **7**

Q.6 i. Compare conventional and non- conventional energy sources with at least six points. **3**
ii. Illustrate the detailed layout of thermal power plant with diagram. **7**
OR iii. Represent the structure of power system component from generation to distribution. **7**

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Marking Scheme
RA3CO21 (T) Electrical Machines and Power Systems

Q.1	i)	(d) kVA	**1**
	ii)	(b) reduce eddy current losses	**1**
	iii)	(b) near full load	**1**
	iv)	(d) dc motor.	**1**
	v)	(d) dangerously high.	**1**
	vi)	(a) Connect extra resistance across them during starting	**1**
	vii)	(c) a two-phase motor	**1**
	viii)	(b) Three	**1**
	ix)	(c) Tungsten	**1**
	x)	(d) graphite & concrete	**1**
Q.2	i.	Emf equation of single-phase transformer.	**3**
	ii.	Various connection of three phase transformer (delta and star).	**3.5*2=7**
OR	iii.	Equation needed to solve. Calculate i) iron loss ii) copper loss	**1,3,3**
Q.3	i.	What is back emf? Explain its significance.	**1,2**
	ii.	Explain the basic constructional features of D.C. Machine with neat diagram.	**5,2**
OR	iii.	Illustrate the Torque-speed characteristics of DC shunt and series motors.	**3.5*2=7**
Q.4	i.	Explain how the rotating magnetic field is produced when a three-phase supply is given to induction motor.	**3**
	ii.	What methods are applied to single phase induction motor for starting. Explain in details. (THREE methods)	**2,5**
OR	iii.	Illustrate the various starting methods needed for starting of squirrel cage induction motor. (FOUR methods)	**7**
Q.5	i.	Illustrate the different modes of excitation of stepper motors.	**3**
	ii.	Explain the principle of operation of DC servomotor. write its application also.	**5,2**
OR	iii.	Explain the principle of operation of BLDC motor. How speed of BLDC motor is controlled. Explain in brief.	**4,3**

Q.6	i.	Compare conventional and non- conventional energy sources. (Any six)	**0.5*6=3**
	ii.	Diagram, detailed layout of thermal power plant	**2,5**
	iii.	Represent the structure of power system component from generation to distribution.	**7**

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