EE/T/312/2017 (S)

Bachelor of Electrical Engineering Examination, 2017

(3rd Year, **1st** Semester, Supplementary)

ELECTRICAL MACHINES – III

Time: Three Hours **Full Marks: 100**

(50 marks for each part)
Use a separate Answer-Script for each Part

PART-I.

Answer *any three* questions from this part.
Two marks are reserved for neat and well organised answer

1. a) Explain why a single phase induction motor does not self-start. Discuss its operation based on double revolving field theory. 10
   b) Show that a single phase induction motor can run in either direction if once started. 2
   c) Give the constructional features of a single phase induction motor. 4

2. a) Draw the equivalent circuit of a single phase induction motor based on the two revolving field theory and identify the various parameters involved in it. 8
   b) A 230 volt, 380 watts, 50 Hz, 4-pole single phase induction motor gave the following test results: 8

   No-load test : 230 V, 84 W, 208 A Blocked rotor test : 110 V, 460 W, 6.2 A

   The stator winding resistance is 4.6 Ω and during the blocked rotor test, the auxiliary winding is open. Determine the equivalent circuit parameters.

3. a) Classify single phase induction motors in accordance with the methods of starting. Discuss the capacitor – split phase type of motor with circuit diagram, phasordiagram at starting and a typical torque-speed characteristic. 10

	b) A 400 Watt, 230 volt, 50 Hz capacitor start single phase induction motor has the following standstill for the main and auxiliary windings: Main winding : $Z_m = (8 + j\,6.8)\ \Omega$ Auxiliary winding : $Z_a = (17 + j\,6.0)\ \Omega$ Find the value of starting capacitance that will place the main and starting winding currents in quadrature at starting.	6
4.	a) What are the two kinds of emfs induced in the armature of ac commutator machines? Derive expression for these emfs in case of field flux is pulsating.	12
	b) How can you improve commutation in ac commutator machine?	4
5.	a) Draw and explain the phasor diagram of a single phase series motor.	8
	b) Show with the help of phasor diagram that a compensated series motor possesses better speed-torque characteristic better power factor operation and improved commutation as compared to an uncompensated series motor.	8

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B. ELEC. ENGG. 3RD. YEAR 1ST SEMESTER EXAMINATION, 2017
(1st / ~~2nd~~-Semester/~~Repeat~~/Supplementary/~~Annual/Bi-Annual~~)

SUBJECT: - ELECTRICAL MACHINES-III

Time: ~~Two hours~~/Three hours/ ~~Four hours/ Six hours~~

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	Answer any Three Questions Two marks are for neat and systematic answers	
Q6.	Justify the following (any four) a) OCC is non linear while SCC is linear. b) It is not mandatory to laminate the rotor of a synchronous machine, but the rotor of salient pole machine is laminated. c) Zero power factor characteristics (ZPFC) of an alternator does not start from origin. d) Mmf method to determine voltage regulation of an alternator is optimistic. e) A cylindrical rotor synchronous machine has long rotor compared to a salient pole synchronous machine of same rating.	4x4
Q7. (a)	Derive the expression for distribution factor of a distributed winding.	8
(b)	Develop the power angle characteristics of cylindrical alternator. Also determine the synchronizing power coefficient for the same.	8
Q8. (a)	Develop the phasor diagram of a cylindrical rotor alternator.	8
(b)	A 100 kVA, 440V, 3 phase, star connected, alternator has the following data: F&W Loss= 340W, Open circuit Core Loss=480W, Field winding resistance at 75^0C=180 ohm, Ra=0.02 ohm/phase The voltage applied to field winding is 220V. Calculate alternator efficiency at 0.8 pf, at half load.	8
Q9. (a)	Why cylindrical rotor theory not valid for salient pole machine? Describe two reaction theory.	8
(b)	Develop the power angle characteristics of salient pole alternator.	8

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B. ELEC. ENGG. 3RD. YEAR 1ST SEMESTER EXAMINATION, 2017

(1st / ~~2nd~~-Semester/~~Repeat~~/Supplementary/~~Annual/Bi-Annual~~)

SUBJECT: - ELECTRICAL MACHINES-III

Full Marks 100

Time: Two hours/Three hours/ Four hours/ Six hours (50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
Q10.	Write short notes on(any two) : a) ZPF method for calculation of voltage regulation b) Emf method of determination of voltage regulation. c) Operating chart of an alternator. ----------	8x2