

Bachelor of Electrical Engineering Examination, 2018

(3rd Year, 1st Semester)

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.

Two marks are for neatness and well-organised answer.

1.	a) For a single-phase induction motor, give explanation for the following : i) Behaviour of the motor with its rotor at standstill and with only main winding excited. ii) The forward flux wave is several times greater than the backward flux wave at normal rotor speed, but they are exactly equal at standstill.	10
	b) Give the constructional features of a single phase induction motor.	3
	c) Explain why a single phase induction motor, as compared to a three-phase induction motor, has larger slip, less efficiency and more noise.	3
2.	a) Draw the equivalent circuit of a single-phase induction motor and obtain there from its approximate equivalent circuit stating the various assumption(s) made.	10
	b) A 220 volt, single-phase induction motor gave the following test results: Blocked-rotor test : 120 Volt, 9.6 Ampere, 460 Watt No-load test : 220 Volt, 4.6 Ampere, 125 Watt The stator winding resistance is 1.5Ω , and during the blocked-rotor test, the starting winding is open. Determine the equivalent circuit parameters. Also find the core, friction and windage losses.	6
3.	What is resistance split-phase motor? For a resistance split phase motor, draw the phasor diagram and find the value of resistance for getting i) maximum starting torque, and ii) maximum torque per ampere.	2+(7+7)

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4.	a) Explain the operation of dc series motor when connected to an ac source. What measures may be adopted to improve the performance of dc series motor when fed with ac?	8
	b) Draw and explain the phasor diagram of a single phase series motor.	8
5.	a) Explain the construction and principle of action of a repulsion motor. What are its high impedance and low impedance positions?	6
	b) Develop the phasor diagram of a repulsion motor and show there from that its power factor improves with the increase in speed.	6
	c) Draw the simplified phasor diagram of a repulsion motor and show that its commutation at synchronous speed is superior.	4

B. ELEC. ENGG. 3RD. YEAR 1ST SEMESTER EXAMINATION, 2018
 (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
Q6.	<p align="center">Answer any Three Questions Two marks are for neat and systematic answers</p> <p>Justify the following (any four)</p> <p>a) Mmf method to determine voltage regulation of an alternator is optimistic.</p> <p>b) A cylindrical rotor synchronous machine has smaller D/L ratio compared to a salient pole synchronous machine of same rating.</p> <p>c) Liquid hydrogen is used as cooling medium for large alternator armature windings.</p> <p>d) It is not mandatory to laminate the rotor of a synchronous machine, but the rotor of a salient pole machine is always laminated.</p> <p>e) Zero power factor characteristics (ZPFC) of an alternator does not start from origin.</p>	4x4
Q7. (a)	Explain the Zero Power Factor Method for calculation of voltage regulation in alternators.	8
(b)	Develop the power angle characteristics of salient pole alternator and sketch the same showing the point of maximum power.	8
Q8. (a)	Develop the phasor diagram of a cylindrical rotor alternator under both leading and lagging load condition	8
(b)	A 6.6 kV, 100MVA, 3-ph, 50Hz, 8 Pole, Y-connected, salient pole alternator is delivering rated load at unity power factor. Find the maximum power the alternator can deliver with excitation remaining unchanged from the current operating condition. Assume $X_d=1.8$ ohm/ph, $X_q=1.2$ ohm/ph and $r_a=0$ for the alternator.	8
Q9. (a)	Why cylindrical rotor theory is not applicable for salient pole machine? Describe two reaction theory.	8
(b)	What is hunting of an alternator? Why does it happen? Why is it	

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Q.10.	<p>necessary to define three sets of synchronous reactance?</p> <p>Write short notes on (any two) :</p> <ul style="list-style-type: none">a) Slip Test of Alternators.b) V curves of a synchronous motor.c) Different starting techniques of synchronous motors. <hr/>	8 8X2
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