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Daffodil International University

Department of Electrical and Electronic Engineering

Faculty of Engineering

Mid Term Examination, Fall – 2025

Course Code: 0713-223
Section: A, B, C
Full Marks: 25

Course Title: Energy Conversion II
Level-Term: L2-T2
Exam Date: October 12, 2025

Teacher's Initial: NR
Time: 1.5 Hours

Notes: Answer all the questions below. Right margin shows the course outcomes and allocated marks.

Q1.	(a) **Describe** brushless excitation scheme of synchronous generator with proper diagram that includes a pilot exciter.	CO-1 C(2)	5
	(b) **Describe** the two bright and one dark lamp method to synchronize the phase sequence with proper diagrams.	CO-1 C(2)	4
Q2.	(a) Using phasor diagram, **describe** the effect of change of excitation of an alternator providing constant power output.	CO-2 C(4)	4
	(b) **Mention** the conditions that must be maintained for parallel operation of synchronous generator?	CO-2 C(2)	2
Q3.	(a) Two alternators A and B operate in parallel and supply a load of 10 MW at 0.8 p.f. lagging (a) By adjusting steam supply of A, its power output is adjusted to 6,000 kW and by changing its excitation, its p.f. is adjusted to 0.92 lag. **Find** the p.f. of alternator B. (b) If steam supply of both machines is left unchanged, but excitation of B is reduced so that its p.f. becomes 0.92 lead, **find** new p.f. of A.	CO-3 C(4)	4
	(b) A 480-V, 50-Hz, Y -connected, six-pole synchronous generator has a per-phase synchronous reactance of 1.0 Ω. Its full-load armature current is 60 A at 0.8 PF lagging. This generator has friction and windage losses of 1.5 kW and core losses of 1.0 kW at 60 Hz at full load. The armature resistance is negligible and the field current has been adjusted so that the terminal voltage is 480 V at no load. (i) **Calculate** the speed of rotation of this generator. (ii) **Determine** the terminal voltage of this generator if the following are true, 1. It is loaded with the rated current at 0.8 PF lagging. 2. It is loaded with the rated current at 1.0 PF. 3. It is loaded with the rated current at 0.8 PF leading. (iii) **Calculate** the efficiency of this generator (ignoring the unknown electrical losses) when it is operating at the rated current and 0.8 PF lagging. (iv) **How** much shaft torque must be applied by the prime mover at full load? **How** large is the induced counter torque? (v) **Determine** the voltage regulation of this generator at 0.8 PF lagging? At 1.0 PF? At 0.8 PF leading?	CO-3 C(4)	6