Reg. No.



ANIPAL INSTITUTE OF TECHNOLOGY

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL - MAY 2017

SUBJECT: POWER SYSTEM OPERATION & CONTROL [ELE4008]

REVISED CREDIT SYSTEM

Time:	3 Hours Date: 27 April 2017	Max. Marks: !	50
Instructions to Candidates:			
	✤ Answer ALL the questions.		
	 Missing data may be suitably assumed. 		
	 Use of non-programmable calculator is permitted. 		
1A	Why is circuit theory approach preferred over the energy conversion approach in the synchronous machines?	modelling (02	2)
1B	A star connected balanced three phase supply is defined by $v_{RN} = 586.89 \sin(a)$ Convert the above voltages to two phase voltage using Parks transformation.)t + 30) . (03	3)
1C	Starting from the dynamic model of synchronous machine, draw the phasor diag salient pole alternator.	gram for a (05	5)
2A	Explain why a stabilization network is included in the excitation system of a gene	erator. (0 4	4)
2B	A 60 Hz, 138kV 3 phase transmission line is 225 km long. The distributed line p are R = $0.169 \Omega / \text{km}$, L = $2.093 \text{ mH} / \text{km}$ and C= $0.01427 \mu\text{F} / \text{km}$ and G = 0. The tra line delivers power of 40 MW at 132 kV with 0.95 power factor lagging. Find the end voltage and current.	arameters nsmission le sending (06	6)
3A	For the power system shown in fig below, magnitude of voltages at bus 1 and 2 an unity. The impedance of the transmission line is $0.1 \angle 85^\circ$.	e equal to	



- a) What is the maximum power (-P₁₂) that can be received by V_2 and at what θ_{12} does this occur.
- b) When $\theta_{12} = 85^\circ$, what is the active power loss in the line?. (06)
- **3B** For the problem defined in 3A draw the power circle diagram. (04)
- **4**A What is the need for compensation of transmission lines? (03)
- **4B** With neat diagram explain how a unified power flow controller (UPFC) can be used to provide real and reactive power compensation in a transmission line. (07)

- **5A** With neat diagrams explain the following characteristics with respect to the steam turbine units
 - a. Input output characteristics
 - b. Incremental heat rate characteristics
 - c. Net heat rate characteristics
- **5B** The incremental heat rate characteristics for two thermal generation units is as given below.

Generation Unit 1 : 5000 + 215 P_1 + 0.5 P_1^2 Rs / hr

Generation Unit 2 : 5000 + 270 P_2 + 1 P_2^2 Rs / hr

The minimum and maximum allowable load on each unit is 39 MW and 150 MW. By Newton's method find the economic scheduling for a load of 200 MW. Determine the total generation cost at the end of two iterations staring with $\lambda = 0$ and initial generation P₁ = 80, P₂ = 120.

(07)

(03)