NOTE : The submission time of the Question Paper Answer Sheet is 24 Hhrs from the scheduled time (*exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
No Submission will be entertained after 24 Hrs

Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

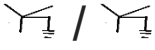
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Assignment based End Semester Examination, July 2020

Course: Power System Analysis & Stability — **Semester: VI**
Program: B.Tech. Electrical Engineering — **Time: 3 Hrs**
Course Code: EPEG-3005 — **Max. Marks: 100**

Instructions:

1. **Attempt all the questions (Theory, Numerical, Case study etc.) on A4 size blank sheets.**
2. **Attempt all questions serially as per question paper.**
3. **Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.**
4. **Scan the whole answer script and check the resolution carefully before upload on the blackboard. Note that answer scripts will be considered for evaluation only through Blackboard. No other mode of submission is acceptable.**
5. **You are expected to be honest about each attempt which you make to progress in life**

SECTION A [5x4]

S. No.		**Marks**	**CO**
Q 1	The reactance of a generator designated "G "is given as 0.35 p.u. based on the generator's nameplate rating of 1.5 KV, 400 MVA. The base for calculations is 10 KV, 100 MVA. Find "X" on the new base.	**5**	**CO2**
Q2	Explain the significance of acceleration factor (alpha) in case of load flow analysis.	**5**	**CO2**
Q3	How the rating of a circuit breaker does selected in power system network?	**5**	**CO1**
Q4	Draw the zero sequence network of transformer in the following cases: Δ /  Δ / Δ 	**5**	**CO4**

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SECTION B [10 x4]			
Q5	A 35 MVA, 17 kV Alternator, with solidly grounded neutral, has a sub-transient reactance of 0.2 p.u. The negative and zero sequence reactances are 0.25 and 0.10 p.u. respectively. A LL-G fault occurs at the terminals of an unloaded alternator. Determine the fault current and the line-to-line voltages. Assume the resistance to be neglected.	**10**	**CO2, CO4**
Q6	A 50 Hz generator is delivering 70% of the power that it is capable of delivering through a transmission line to an infinite bus. A fault occurs that increases the reactance between the generator and the infinite bus to 300% of the value before the fault. When the fault is isolated, the maximum power that can be delivered is 70% of the original maximum value. Determine the critical clearing angle for the aforementioned condition.	**10**	**CO1, CO4**
Q7	Explain the flow chart of Newton Raphson load flow method applied for load flow analysis.	**10**	**CO2**
Q8	The fuel inputs per hour of plant 1and 2 are given as : $\mathbf{F_1 = 0.2P_1^2 + 40P_1 + 120\ (\$/hr)}$ $\mathbf{F_2 = 0.25P_2^2 + 30P_2 + 150\ (\$/hr)}$ Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW, and transmission losses are neglected. If the load is equally shared by both the units, determine the savings obtained by loading the units as per equal incremental production cost.	**10**	**CO3**
SECTION-C [20x2]			
Q9	(a)- Derive the swing equation w.r.t. the power system dynamics. Also analyze steady state stability of the power system by the linearization of swing equation. (b)- Identify the fault presented in the picture and obtain its positive, negative and zero sequence components of 3 phase current.	**20**	**CO2, CO4**

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	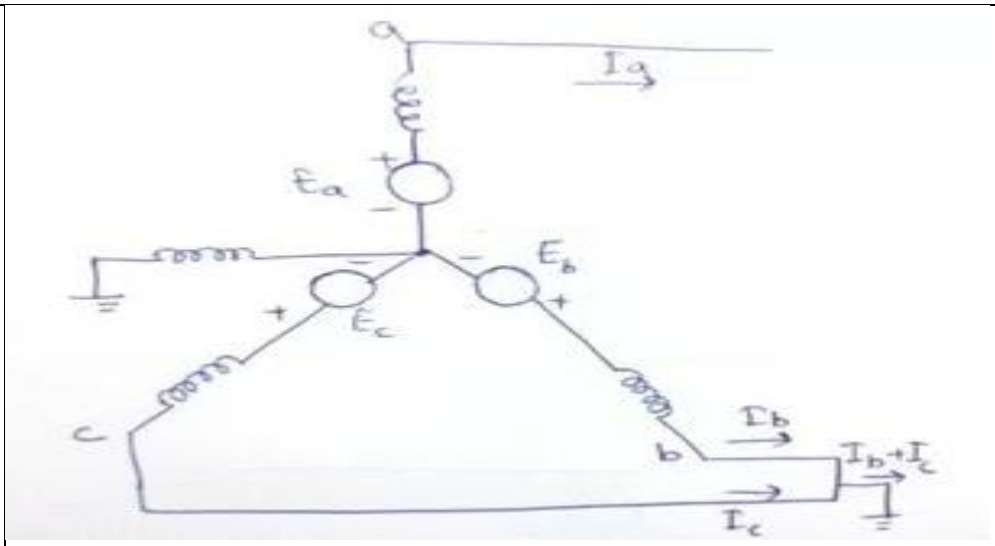 **OR** A 50 Hz four-pole turbo-generator rated 20 MVA, 13.5 KV has an inertia constant of H = 9.0 kW-sec/kVA. Determine the K.E. stored in the rotor at synchronous speed. Determine the acceleration if the input less the rotational losses is 15000 HP and the electric power developed is 5000 kW. If the acceleration computed for the generator is constant for a period of 15 cycles, determine the change in torque angle in that period and the r.p.m. at the end of 15 cycles. [*Assume that the generator is synchronized with a large system and has no accelerating torque before the 15 cycle period begins.*]		
Q10	A 30 MVA, 13.8 kV, 3-phase alternator has a sub-transient reactance of 15% and negative and zero sequence reactances of 15% and 5% respectively. The alternator supplies two motors over a transmission line having transformers at both ends as shown in figure B. The motors have rated inputs of 20 MVA and 10 MVA both 12.5 kV with 20% sub-transient reactance and negative and zero sequence reactances are 20% and 5% respectively. Current limiting reactors of 2.0 ohms each are in the neutral of the alternator and the larger motor. The 3-phase transformers are both rated 35 MVA, 13.2 Δ / 115*Y (*kV) with leakage reactance of 10%. Series reactance of the line is 80 ohms. The zero sequence reactance of the line is 200 ohms.	**20**	**CO1, CO2, CO4**

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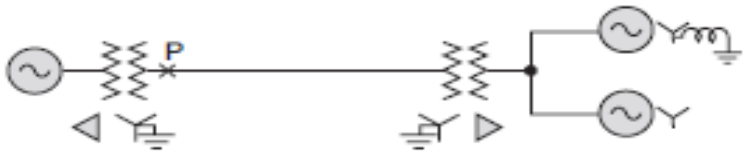
	Determine the fault current when a line to line fault takes place at point *P*.  Figure B		