UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2021

Programme Name: B. Tech ASE+AVE   **Semester   : VI**
Course Name   : AIRCRAFT ELECTRICAL SYSTEM   **Time   : 03 hrs.**
Course Code   : AVEG 3002   **Max. Marks : 100**

Instructions: The Question paper has three sections such as Section A, B and C Section. Section A (Type the Answer) Section (B & C) – Scan and upload. Make use of *sketches/plots (Part B & Part C Section)* to elaborate your answer. Brief and to the point, answers are expected.

	SECTION A (6*5 =30 Marks)		
S. No.	**Questions**	**Marks**	**CO**
Q 1	Write short note on electromagnetic induction. State and explain Faraday's law of electromagnetic induction.	5	CO1
Q 2	Why aircraft is used 400Hz frequency? Discuss the relationship between Speed and frequency and no of poles.	5	CO1
Q 3	Discuss about the Diode and SCR in Aircraft electronic applications.	5	CO2
Q 4	What conditions are required to be fulfilled for parallel operation of generator? List out advantages of parallel operations.	5	CO3
Q 5	Explain the function of aircraft electrical system is to generate, regulate and distribute electrical power throughout the aircraft.	5	CO4
Q 6	What you meant by Electro Static Discharge? List out the instruments required by FAR 91.205 for VFR flight during the day.	5	CO4
	SECTION B (5*10 =50 Marks)		
Q 7	a) Derive the EMF equation of transformer. b) Draw and explain the charactertics of DC Series Motor (i) N Vs. I_a (ii) T Vs. N (iii) T Vs. I_a	10	CO2

Q 8	Discuss the principle of action of a DC generator. Describe briefly its important parts. Write short notes on the following: (i) Principle of operation of DC generator. (ii) Construction and function of commutator. (iii) Lap winding. (iv) Wave winding-merits and demerits	10	CO3
Q 9	For single phase transformer, 5 kVA, 200V/400V, 50 Hz, the equivalent circuit Shown in Figure (1),: **Figure (1)** Calculate the following (i) The efficiency of the transformer at 75% loading with load power factor = 0.7 (ii) At what load or kVA the transformer is to be operated for maximum efficiency? Also calculate the value of maximum efficiency. (iii) The regulation of the transformer at full load 0.8 power factor lag. (iv) What should be the applied voltage to the LV side when the transformer delivers rated current at 0.7 power factor lagging, at a terminal voltage of 400 V?	10	CO2
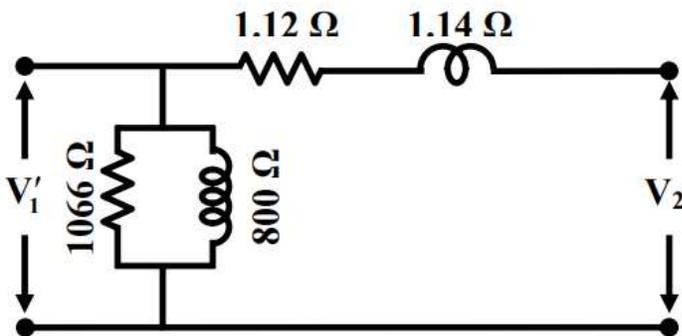
Q 10	Design the typical aircraft electrical system
	      (i) Draw and explain the layout of Aircraft 115V AC electrical system
	      (ii) Secondary power generation
	      (iii) Emergency power generation
		10	CO4

Q 11	A series circuit consists of 0.5µF capacitor, a coil of inductance of 0.32H and a resistance of 40Ω and a 20Ω non inductance resistor. Calculate the value of resonant frequency of the circuit. When the circuit is connected to a 30V a.c supply at this resonant frequency, determine: (i) The potential difference across each of the three components. (ii) The current flowing in the circuit (iii) The power absorbed by circuit **(Or)** A coil having a resistance of 6Ω and an inductance of 0.03 H is connected across 50 V , 60 Hz supply calculate (i) The current (ii) Reactance and Impedance (iii) Phase angle (iv) Power factor (v) Active Power	**10**	**CO1**

SECTION-C (1*20 = 20 Marks)
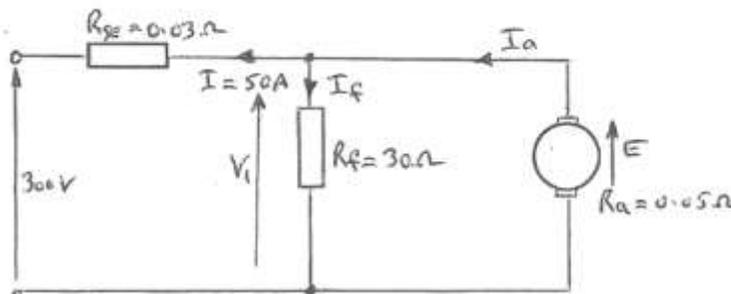
Q 12	a) An 8 – Pole Aircraft Generator has 500 armature conductors and has a useful flux per pole of 0.065 Wb. What will be the EMF Generated if it is Lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same EMF if it is wave wound? b) A short-shunt compound generator Shown in Figure supplies 50 A at 300 V. If the field resistance is 30 Ω, the series resistance 0.03 Ω and the armature resistance 0.05 Ω, determine the e.m.f. generated		
	(Or) A 200V DC shunt motor takes a total current of 150 A and runs at 800 rpm. The resistance of the armature winding and of shunt field winding is 0.2 and 50 Ω, respectively. What is back emf? Give its significance. Compute (i) The torque developed by the armature and (ii) copper losses. If the friction and iron losses amount to 1500 W, also calculate (iii) Power and (iv) Efficiency	**20**	**CO3**