

JK Lakshmipat University, Jaipur

Institute of Engineering and Technology

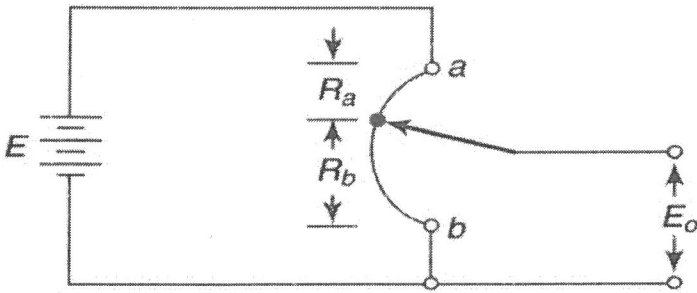
BTech. (3rd Sem.) all branches **End Term Exam (Dec. 2022)**

Course Code & Name: (ES 1107) Engineering Measurements and Machines

Time: 2 hr 30 hr.

Max. Marks: 60

Attempt all questions.

Q1 (A)	The overall resistance of a slide wire of an automobile fuel level gauge in Fig. is 6 kΩ. If the wiper arm actuated by float is located at 2/3 mark. i.e. $R_a = 2$ kΩ and $R_b = 4$ kΩ , determine E_o if $E = 12$ V. 	05 Marks LO-1,3								
Q1 (B)	A 0–400 V voltmeter is specified to be accurate within 1.2% full scale deflection. Calculate the limiting error when the instrument measures a voltage of 175 V.	LO-1 05 Marks								
Q2	Draw a block diagram of a domestic central heating system which has the following elements: (a) A thermostat which has a dial which is set to the required temperature and has an input of the actual temperature in the house, and which operates as a switch and gives an output electrical signal which is either on or off. (b) A solenoid valve which has the input of the electrical signal from the thermostat and controls the flow of oil to the central heating furnace. (c) A heating furnace where the input is the flow of oil and the output is heat to the rooms via water flowing through radiators in the house. (d) The rooms in the house where the input is the heat from the radiators and the output is the temperature in the rooms.	10 Marks LO-3								
Q3	The open-circuit and short-circuit tests conducted on a 50 kVA transformer gave the following results: <table><tr><td>OC test:</td><td>SC test:</td></tr><tr><td>Primary voltage = 3300 V</td><td>Primary voltage = 124 V</td></tr><tr><td>Secondary voltage = 400 V</td><td>Primary current = 15.4 A</td></tr><tr><td>Primary power-input = 460 W</td><td>Primary power-input = 540 W</td></tr></table> Calculate (a) the efficiency at full-load and 0.8 power-factor lagging and (b) the voltage regulation at 0.8 power-factor lagging.	OC test:	SC test:	Primary voltage = 3300 V	Primary voltage = 124 V	Secondary voltage = 400 V	Primary current = 15.4 A	Primary power-input = 460 W	Primary power-input = 540 W	10 Marks LO-3,4
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Primary voltage = 3300 V	Primary voltage = 124 V									
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Primary power-input = 460 W	Primary power-input = 540 W									
Q4	You have performed an experiment on the lab-scale thermal power plant and evaluated the efficiency of the steam turbine. Draw a schematic of the set-up and name all the essential components. Suppose you need to expand the lab scale unit to produce electricity at a larger scale, such as an actual thermal power station. What change(s) would you make in the existing unit and why?	10 Marks LO-2,4								

Q5	Compressive and tensile strength of a material are important properties. Define these strengths and give the real-life example where these strengths are important. Recently, mishappening was occurred in Morbi (Gujarat). The diameter of pin which hold the wire is 20 mm and strength of that material is 400 MPa. Calculate the number of persons for which this bridge is safe, if average weight of each person is 70 Kg (1 Kg = 9.81 N). The dead load of bridge is 3 times the live load (live load means load due to human beings).	05 Marks LO-2
Q6	In Rajasthan the air pollution is one of the major environmental problems. It can cause serious health consequences such as cancer, heart disease and high mortality rates. The people of Rajasthan contribute significantly to air pollution in urban and rural areas or areas. The first largest state in India, Rajasthan, the subject of this concept, is one of the most polluted areas in the country. Severe air pollution of concern particles and high hydrocarbons. The height of the Rajasthan industry is a major source of air pollution compared to the rest of India. - Identify which size fraction of particulate matter is more important? - Suppose if you need to prepare a model for particulate matter (PM) and high hydrocarbon pollution then write the key steps involved in modelling.	05 Marks LO-2,4