Total number of printed pages:4 **UG/3rd/UIE303**

2021

ELECTRICAL AND ELECTRONIC MEASUREMENTS

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) What is the role of the following in an electromechanical instrument? 12

   (i) Controlling Torque.

   (ii) Damping Torque.

   (iii) Suspension

   Also, discuss the different mechanisms by which each of the above is applied in the instrument.

   b) A PMMC instrument has a coil of dimensions 20 mm × 15 mm. The flux density in the air gap is 2.2×10^{-3} wb/m2 and the spring constant is 0.17×10^{-6} N-m/rad. Determine the number of turns required to produce an angular deflection of 90° when a current of 10 mA is flowing through the coil. 5

   What are the advantages and disadvantages of PMMC instrument? 3

2. a) Differentiate between ballistic and vibration galvanometer. Also, draw the respective diagrams. 7

b) Deduce the expression for deflection θ in a moving iron instrument. 8

c) How a PMMC meter with full scale deflection of 10mA and an internal resistance of 10Ω can be extended to measure the current in the following ranges? 5
(i)0-5 A
(ii)0-100A

3. a) How power measurement is done using an electrodynamometer type wattmeter? Explain using a suitable diagram 7

b) A 3-phase, 220-V motor load has a power factor of 0.3. Two wattmeters are connected to measure the input power and is shown to be 20 kW. Find the reading on each instrument. 6

c) Describe the construction and working of electrostatic instruments using a suitable diagram. Also deduce the expression for deflection θ. 7

4. a) Draw the phasor diagram of single-phase induction type energy meter and determine the expression for deflecting torque. Also, describe its operation. 10

b) A single phase kWhr meter has a meter constant of 300 revolutions per kWh. It is found on testing that it makes 30 revolutions in 52 seconds at 4 kW full load. Find out the percentage error. 5

c) Explain in brief the working of thermocouple type instruments. 5

5. a) How a potentiometer is used for the measurement of unknown voltage, current and resistance? Explain using circuit diagrams. 11

Also, write the advantages of potentiometers in measurements and calibrations.

b) The Wheatstone bridge in figure 1 is used to find the value 4

of resistor R_X. The galvanometer G of the bridge indicates zero current

when R_1=100Ω, R_2=70Ω and R_3=150Ω. If R_3 is known with ±5% tolerance on its nominal value of 150Ω, what is the range of R_X in Ohms?

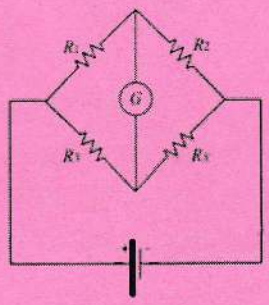

Figure 1

c) Describe a suitable method for checking the insulation resistance of a cable. 5

6 a) Describe a bridge method for measurement of capacitance and determine the expression for unknown capacitance. 7

b) The four arms of a bridge are: arm ab, a pure resistance; arm bc, a resistance of 150 Ω in parallel 7

with a capacitor of 0.1 μF; arm cd, a resistance of 2500 Ω in series with a capacitor of 0.5 μF; and arm da , a resistance of 740 Ω. Determine the resistance in arm ab and calculate the value of frequency for which the bridge can be balanced.

c) Why Kelvin's Bridge method is suitable for measurement of low resistance? Explain its working using a diagram. 6

7 a) Write short notes on the following: 7x2=14

(i) Testing of energymeter

(ii) Measurement of earth resistance.

b) Describe a suitable method for localization of cable faults. 6

Total number of printed pages:2

UG/3rd/UFET303

2021

BIOCHEMISTRY & HUMAN NUTRITION

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Define biomolecules. Describe macromolecules as polymers of smaller molecules.	2 x 3=6
	b)	What is N-equilibrium? Explain Positive and Negative nitrogen balance.	2+2+2 = 6
	c)	Explain ETC giving suitable diagram.	8
2.	a)	Define metabolism. Explain the role of NADH and $FADH_2$ in the process of cellular respiration.	6
	b)	What is an enzyme co-factor? Explain the ES complex.	2+4 = 6
	c	Describe briefly the metabolism of glucose 6 phosphate.	8
3.	a)	Define the following terms (any five):	2X5 = 10
		i)ATP ii) Monomer	
		iii) Kinase iv) Hydrophobic	
		v) Substrates vi) Decarboxylation	
	b)	Explain oxidative phosphorylation giving suitable diagram.	5
	c)	Describe the induced-fit model of enzymes.	5

4. a) What is an active site of an enzyme? What is the difference between active site and allosteric site? 5

b) Define amino acid? Give important characteristics of an amino acid. 5

c) What is protein denaturation? Explain the important factors that can lead to denaturation of proteins. 10

5. a) Distinguish between (any three): 3x3=9

i)Essential amino acids and Non-essential amino acids

ii)Co-factors and co-enzymes

iii)Acidic and basic amino acids

iv) Micromolecules and macromolecules

b) Explain in brief how fats are digested. 5

c) What is optimum temperature? How does temperature affect the action of enzymes on their substrates? 6

6 a) Explain the difference between competitive and non-competitive inhibition, with reference to one example of each. 6

b) What is a cellular pool? What are its two phases? 7

c) What is substrate concentration of an enzyme? How does enzyme activity change as substrate concentration increases? 7

7. Write short notes on any four of the following 4x5=20

a) Nitrogen pool

b) Digestion & absorption of protein

c) HMP

d) Secondary structure of protein

e) Polysaccharide