

U.G. 1st Semester Examination - 2023**PHYSICS****[Skill Enhancement Course (SEC)]****Course Code : PHY-SEC-T-01****(Electrical Circuit and Network Skills)****[NEP-2020]**

Full Marks : 35

Time : $1\frac{1}{2}$ Hours*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***GROUP-A**

1. Answer any five questions :

 $1 \times 5 = 5$

- State and explain Ohm's law.
- How can you obtain a 2Ω resistor using a desired number of 10Ω resistors only?
- What do you mean by step-down transformer?
- State and explain KCL.
- Define Faraday's constant.
- Define power factor.
- Write down the main advantage of using a fuse wire.

[Turn over]

- h) Write down the colour codes of the wires of a three-pin plug.

GROUP-B

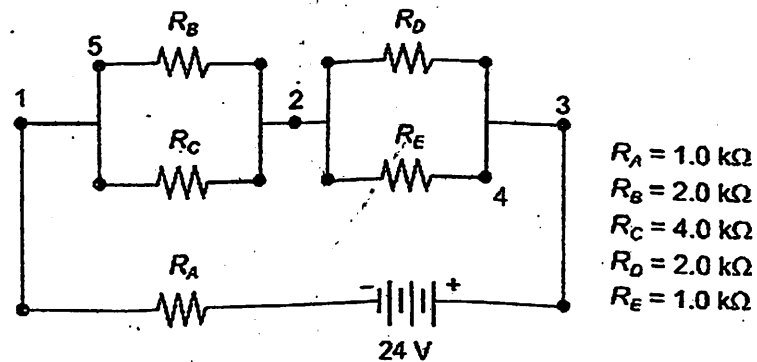
2. Answer any two questions : $5 \times 2 = 10$

- a) Write short notes on Star-Delta transformation. 5

- b) With the help of necessary diagrams, explain the conversion of an ammeter into a voltmeter and vice versa. Explain why 220V AC is more dangerous compared to 220V DC supply. Define the temperature coefficient of resistance. $2+2+1=5$

- c) Write down the working principle of a single-phase motor. Explain why motor cores are laminated? $4+1=5$

- d) Write down the significance of the name multimeter. Determine the voltage drops across the resistors R_A , R_B , R_C , R_D and R_E , in the given circuit.



$$1+4=5$$

GROUP-C

3. Answer any two questions : $10 \times 2 = 20$

- a) i) Write down the working principle of a full-wave rectifier. What are the major advantages of a bridge rectifier over a center tapped full-wave rectifier?

- ii) What do you mean by high pass and low pass filters? Write down the working principle of a shunt capacitor filter. $(3+2)+(2+3)=10$

- b) i) Calculate the capacitance of a capacitor of radius equivalent to the Earth's radius.

- ii) An inductor L is connected with a sinusoidal voltage. Find out the instantaneous current. Draw and explain the phasor diagram.

(3)

[Turn over]

iii) Explain briefly the working principle of a transformer. $2+(3+2)+3=10$

c) Define mean value and r.m.s. value of an A.C. Find out their expressions. Define form factor. Calculate its' value. $2+(3+3)+(1+1)=10$

d) i) Explain briefly the working principle of miniature circuit breakers (MCBs) and their advantages in electrical protection.

ii) Write down the working principle of a DC generator. $5+5=10$
