

**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 : 1×5=5
- a) State and explain Ohm's law.
  - b) How can you obtain a  $2\ \Omega$  resistor using a desired number of  $10\ \Omega$  resistors only?
  - c) What do you mean by step-down transformer?
  - d) State and explain KCL.
  - e) Define Faraday's constant.
  - f) Define power factor.
  - g) 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

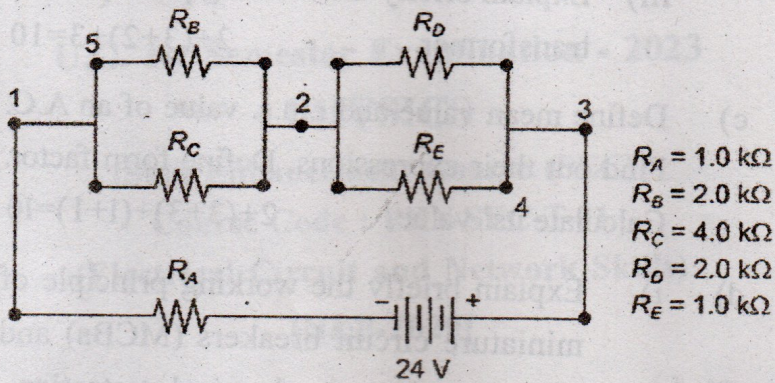
b) With the help of necessary diagrams, explain the conversion of an ammeter into a voltmeter and vice versa. Explain why 220V AC is more dangerous compared to 220V DC supply. Define the temperature coefficient of resistance.

$2+2+1=5$

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 : 10×2=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.



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.  $5+5=10$