PHY1220 ELECTRICITY AND MAGNETISM
CONTINOUS ASSESSMENT TEST

INSTRUCTIONS: ANSWER ALL QUESTIONS AND SHADE THE CORRECT ANSWERS ON THE PROVIDED ANSWER SHEET. EACH QUESTION CARRIES ONE MARK

CONSTANTS: electron charge = 1.6×10^{-19}C, permeability of free space = $4\pi \times 10^{-7}$ T.m/A

Q1. Two coins lie 1.5m apart on a table. They carry identical charges. How large is he charge on each coin if a coin experiences a force of 2N?
(A). 5×10^{10}C (B) 2×10^{-5}C (C) 5×10^{10}C^2 (D) 5×10^{-10}C

Q2. If two equal charges each 1C are separated in air by a distance of 1km, what would be the force between them?
(A) 9×10^3N (B) 9×10^{-3}N (C) 0.9N (D) 9N

Q3. How much work is required to carry an electron from the positive terminal of a 12V battery to the negative terminal?
(A) 1×10^{-18}J (B) 1.8×10^{18}J (C) 1.9×10^{-18}J (D) 1.9×10^{18}J

Q4. A 1.2 micro farad capacitor is charged to 3.0 kV, compute the energy stored in the capacitor
(A) 5.4J (B) 5.4×10^{-2}J (C) 54J (D) 540J

Q5. 10mm from a certain charge, its electric field is 10kV/m. The magnitude of the field 20mm from the charge is
(A) 2.5kV/m (B) 5.0kV/m (C) 7.1kV/m (D) 10kV/m

Q6. An electric force of 1.0×10^5 N acts on a charge of 5.0×10^{-10} C that is between two parallel metal plates 4.0 mm apart. The potential difference between the plates is
(A) 1.25×10^{-12} V (B) 32 V (C) 80 V (D) 1.6×10^{11} V

Q7. The potential difference between a certain thundercloud and the ground is 4 MW. During a lightening stroke, 80 C of charge is transferred between the cloud and the cloud. The energy dissipated during the stroke is
(A) 5×10^{-6} J (B) 2×10^5 J (C) 3.2×10^7 J (D) 3.2×10^8 J

Q8. A storage battery is being charged at a rate of 75 W. If the potential difference across its terminals is 13.6 V, charge is being transferred between its plates at
(A) 0.18 C/s (B) 2.8 C/s (C) 5.5 C/s (D) 1020 C/s

Q9. A certain wire has the resistance R. Another wire, exactly the same except having twice the diameter, has resistance
(A) 1/4R (B) 1/2R (C) 2R (D) 4R

Q10. Which one or more of the following combination of units is equal to the watt?
(A) J/s (B) A$^2\Omega$ (C) A & B (D) V^{2}A

Q11. A 5 Ohm resistor and a 10 Ohm resistor are connected in parallel. The equivalent resistance is
(A) 0.3 Ohm (B) 3.3 Ohm (C) 7.5 Ohm (D) 15 Ohm

Q12. A capacitor connected to a 24V battery has a charge of 0.004 C. Its capacitance is
(A) 1.67 microfarad (B) 60 microfarad (C) 167 microfarad (D) 0.048 Farad

Q13. The equivalent resistance of two, 20 microfarad capacitance in series is
(A) 0.1 microfarad (B) 10 microfarad (C) 30 microfarad (D) 40 microfarad

Q14. The equivalent resistance of a two 20 microfarad capacitors in parallel is
(A) 0.1 microfarad (B) 10 microfarad (C) 30 microfarad (D) 40 microfarad

Q15. A charged 50 microfarad capacitor has energy of 1J. The voltage across it is
(A) 141 V (B) 200 V (C) 20 kV (D) 40 kV

Q16. A light bulb has a resistance of 240 ohms when lit. How much current will flow through it when it is connected across a 10V operating voltage?
(A) 5A (B) 0.5A (C) 50A (D) 0.05A

Q17. An electric iron of resistance 20ohms takes a current of 5A. Calculate the thermal energy developed in 30 seconds
(A) 1.5kJ (B) 15J (C) 15kJ (D) 1.5J

Q18. What resistance must be placed in parallel with a 12ohms to obtain a combined resistance of 4ohms?
(A) 6 Ohms (B) 60 Ohms (C) 0.6 Ohms (D) 0.06 Ohms

Q19. Compute the value of B in air at a point 5cm from a long straight wire carrying current of 15A
(A) 6T (B) 60T (C) 6×10^{-2}T (D) 6×10^{-5}T

Q20. An air core solenoid with 2000 loops is 60cm long and has a diameter of 2cm. If current of 5A is sent through it, what will be the flux density through it?
(A) 21T (B) 210T (C) 0.21T (D) 0.021T