BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – Diploma in Electronics & Communication Engineering / Diploma in Electrical Engineering / Diploma in Computer Science & Engineering

Course Name – Physics II

Course Code – DECE202 / DEE202 / DCSE202

(Semester – 2)

Time allotted:3 Hours   **Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)   10 x 1 = 10

1. *Choose the correct alternative from the following*

(i)   Wheatstone bridge principle are generally applied to measure

    a. Resistance   b. charge

    c. voltage   d. current

(ii) An elastic ball of mass 'm' strikes the wall with a velocity 'u' and returns back with same velocity, the change of momentum of the ball is-

    a. mu   b. zero

    c. 2mu   d. -mu

(iii) The force between two long anti-parallel current carrying conductor is

    a. attractive   b. repulsive

    c. both attractive and repulsive   d. none of these

(iv) Which one of the following quantity is equal to the rate of change of linear momentum

    a. Work   b. Force

    c. Power   d. Kinetic energy

(v)   A lift is moving upwards with an acceleration 'a', a man of mass 'm' will experience weight

    a. ma   b. m(a-g)

    c. m(g-a)   d. m(a+g)

(vi) The force on a charge q moving with a velocity $\vec{v}$ through an electric field $\vec{E}$ and magnetic field $\vec{B}$ is

    a. $\vec{F} = q\vec{E} + q(\vec{v} \times \vec{B})$ b. $\vec{F} = q\vec{E} + q\vec{v} \times \vec{B}$

    c. $\vec{F} = q\vec{v} + q\vec{E} \times \vec{B}$ d. $\vec{F} = q(\vec{E} \times \vec{B}) + q\vec{B}$

(vii) The force on a charge q which is at rest through an electric field $\vec{E}$ and magnetic field $\vec{B}$ is equal to

    a. $\vec{F} = q(\vec{v} \times \vec{B})$ b. $\vec{F} = \dfrac{q}{(\vec{v} \times \vec{B})}$

    c. $\vec{F} = \dfrac{(\vec{v} \times \vec{B})}{q}$ d. $q\vec{E}$

(viii) When mass and speed are doubled, the kinetic energy increases-

    a. 2 times   b. 4 times

    c. 8 times   d. 16 times

(ix) The force on a current carrying conductor of length l placed in a uniform magnetic field $\vec{B}$, which makes an angle $\theta = 0^0$ with the length (taking in the direction of current) is

    a. 0   b. BI

    c. $BI\,l$ d. 1

(x) At constant temperature, the resistance $\left(R = \dfrac{V}{I} \right)$ of a resistor

    a. increases with V b. decreases with I

    c. Increases with I d. remains constant

Group – B

(Short Answer Type Questions)   3 x5 = 15

Answer any *three* from the following

2. The displacement (S)-time (t) relation of a body moving along a straight line is given by $S \propto t^2$. Calculate velocity and acceleration of the body. Also draw the corresponding velocity- time graph.   5

3. How will you convert a 1.0mA full scale deflection galvanometer of resistance 100Ω into an ammeter to read up to 1.0A?   5

4. What do you mean by the term "radius of gyration"? Show that, toque of a rotating body is equal to the product of moment of inertia and angular acceleration.   1+4

5. Calculate the force per unit length on a straight wire carrying current 3A due to another long parallel wire carrying current 4A placed at a distance of 0.3m.　　5

6. (a) Write down four differences between P-type and N-type semiconductors.　　2+3
   (b) Draw and explain the current voltage characteristics of a forward biased p-n junction diode.

Group – C

(Long Answer Type Questions)　　　　　3x 15 = 45

Answer any *three* from the following

7. (a) Define Watt. An electric bulb is rated 60W-220V. What do you mean by this statement? In this situation, find the strength of current passing through the bulb. What is the resistance of the bulb?　　1+2+2

   (b) Derive the principle of Wheatstone bridge.　　5

   (c) An unknown resistance S is inserted in the left gap of a meter bridge. When the resistance in the right gap is 7 Ω, the null point is obtained at a distance of 30cm from the left end of the wire. Find the value of S. If the resistances are interchanged, find the new null point.　　5

8. (a) Write down the mathematical expression relating to force and torque. A man is carrying heavy weights in his hands in outstretched condition of arm. What will happen if the man suddenly folds his arms?　　2+1
   (b) State perpendicular axes theorem. Hence find the moment of inertia of a solid sphere about an axis tangent to the sphere.　　4

   (c) If the angular momentum of a rotating body is increased by 50%, what will be the percentage increase of rotational kinetic energy of that body?　　3

   (d) State the law of conservation of angular momentum. Hence show that, angular momentum of a rotating system remains conserved in absence of torque.　　5

9. (a) State the factors on which the resistance of a conductor depends.　　2

   (b) Write down the mathematical expression connecting resistance and resistivity of a conductor. Explain which one of resistance or resistivity is fundamental.　　1+2

   (c) The sequences of bands marked on a carbon resistor are white, blue, orange and silver. What is its resistance?　　2
   (d) Compare the resistance of two wires of same material. Their lengths are in the ratio 2:3 and diameters are in the ratio 1:2.　　5

   (e) What do you mean by electro-magnetic induction? State Faraday's laws of electromagnetic induction.　　1+2

10. (a) The reverse saturation current at 300K of a p-n junction Ge diode is 5 µA. Show that voltage to be applied across the junction to obtain a forward current of 50 mA is 0.238 volt.   3

    (b) Explain semiconductor on the basis of 'Band theory'. Discuss briefly the formation of N-type semiconductor.   9

    (c) How can you use diode as a full wave rectifier?   3

11. (a) State Fleming's Right hand rule. What is the S. I. unit of self-induction and obtain its dimension.   2+3

    (b) Find the force on a current carrying conductor placed in a uniform magnetic field.   5

    (c) Two long straight and parallel wires carry 5 A current in opposite directions. The wires are 2 cm apart. Calculate the magnetic induction at the point midway between the wires. What would be the magnetic induction, if the flow of current through the two wires is in the same direction?   5