HIGHER SECONDARY MODEL EXAMINATION 2012

PART III

PHYSICS

Time 2 Hrs

Max.marks 60 Cool off time :15 min

1.Fill in the blanks Score2

A dipole length is……	Dipole moment p=2qa	Torque on a dipole of in a field E is τ = ……..
Electric field E is normal to a surface A	E.A = ……..	Over the surface dV/dX = …….
An electron accelerated in 1 V gains 1 eV energy	1 eV = …….	An electron accelerated in 100 V gains……..J
A dipole is rotated through Θ in a field E	Work done in rotation = ……..	Potential energy change in rotation = ……..

2. a) When a body is negatively charged by friction it means that

a) The body is acquired excess of electrons

b) the body has lost some electrons

c) The body has lost some neutrons score 1

b) Ordinary rubber is an insulator. But special rubber tyres of air craft are made slightly conducting. Why? Score 2

c) A polythene piece rubbed with wool is found to have a negative charge of 4 X 10-6 C.Calculate the number of electrons transferred from wool to polythene. Score 2

3.Two capacitors having 6 μF and 4μF are connected in series across a 120 V supply.

a) Find the equivalent capacitance.

b) Find the charge on each capacitor. score2

4. To study the relation between potential difference and current in an electrical circuit, a student is provided with a resistance wire, a cell and a key

a) Draw a circuit which allows current flow through the resistance wire (1)

b) Modify the circuit by introducing an ammeter, Voltmeter and a rheostat for varying the potential difference across the resistance and to measure that potential difference and the corresponding current.(1)

c) Let in the above experiment the student obtained the following data

Voltage(V)	0	2	4	6	8	10
Current(A)	0	0.1	0.2	0.3	0.4	0.5

Draw a graph connecting V and I using above data. Then establish the relation between V and I as a law.(2)

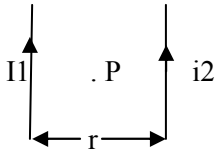
5. Metre Bridge is an instrument to find the unknown resistance of a given metallic wire.

(a) Write down the principle used in metre bridge experiment. (1)

(b) With the help of circuit diagram derive the expression to find the unknown resistance. (2)

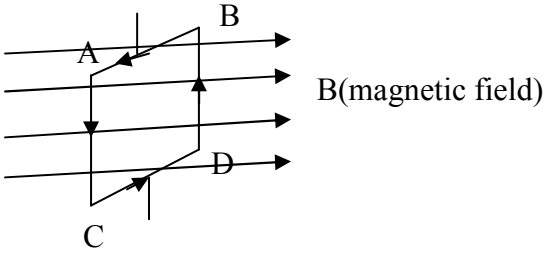
(c) A uniform resistance wire is given in one gap and a standard resistance in the other gap the balance length obtained is 60 c.m. If the wire is divided into two eqal halves and then one half is connected in the same gap. What would be the new balancing length. (1)

6.The figure shows two long parallel wires carrying currents in the same direction.



a) What is the nature of the force between the wires?(1)
b) Derive an expression for the magnitude of the force between the wires?(2)
c) What is the strength of the magnetic field at P?(1)

7. A rectangular loop ABCD made of copper suspended in a magnetic field B is shown in this figure.



Here the conductors ACand BD are perpendicular to the field. A current I is passed through the loop.

a. Write down the expression for the force acting on a current carrying conductor placed in a magnetic field.(1)

b. Using the above expression find the force loop and torque acting on this loop.(1)

c. What is the difference in torque acting on a rectangular loop when it is rotated in a radial and parallel magnetic field.(1)

8. You are gfiven a galvanometer , a low resistance and a high resistance

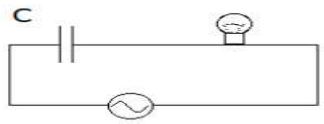
a)Use necessary diagrams to arrange them so that the galvanometer function as i)ammeter,ii) Voltmeter (2)

b) a student finds that the ammeter in the laboratory can measure only up to 1A.Its resistance is 0.8Ω. He wants to measure current up to 7 A. How is it possible? (2)

9. a)A vector needs three quantities for ots specification. Name three independent quantities conventionally used to specify earths magnetic field.(1 ½)

b)If the horizontal and vertical components of earths magnetic field are equal at a place,what is the angle of dip at that place?(1 ½)

10). A lamp of resistance R is connected through a Capacitor of capacitance C to an A.C. Source as shown in figure.



a) Will the bulb glow ? (score: ½)
b) Draw a phasor diagram and write the equation of impedence of the circuit.
(score: 1)
c) If the frequency of A.C. Is increased, what will happen? Justify. (score: 1 ½)

OR

11. In a tuner circuit of radio receivers an electrical circuit is familiar to you is used.
a. Identify the circuit.(½)
b. Deduce an expression for impedance of that circuit.(1 ½)
c. At an airport,a person is made to walk through the doorway of a metel detector,for security reasons.If the person is carrying any thing of metal,the metal detector emits a sound. On what principle does the detector work?(1)
13.Suppose that the electric field part of an electromagnetic wave in vaccum is
E = { (3.1N/C)cos[(1.8rad/m)y + (5.4X106 rad/s) t] } ^i

a.What is the direction of propagation?(1/2)
b. what is the wave length?(1/2)
c. can you write an expression for the magnetic field part of the wave? (1)

OR

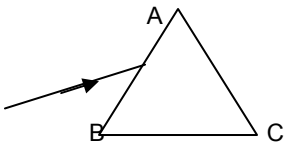
14.Figure below shows different regions of electromagnetic spectrum.
a) Identify the regions A,B,CandD(1)
b)Identify the short and long wavelengths.(1)

Gamma ray	A	U.V	B	I.R	C	D

15.. A lens forms image by refraction at its refracting faces. The refraction obeys the general equation
(-n1/u) + (n2/v) = (n2 - n1)/R (n2 > n1)
(a) An object 'O' be placed in front of a thin lens. Draw the ray diagram to locate the position of final image formed by it. (1)
(b) Write down expression for refraction at both of its refracting faces and arrive at lens maker's formula. (3)
(c) Give a situation where a convex lens act as a concave lens. (1)

OR

16.A ray of light enters the face AB of a prism.

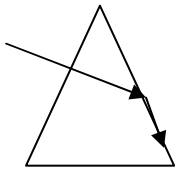


a. Complete the ray diagram to shw the refraction,when the prism is in the minimum deviation position(1)

b.what is th relation between angle of incidence,angle of emergence,angle of the prism and angle of minimumdeviation.(1)

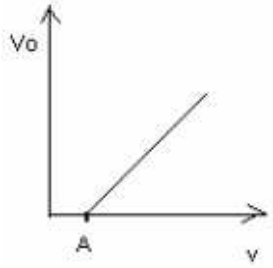
c.At the minimum deviation position what is the relation between A and D?(1)

d.Suppose a ray of light falls normally on the surface AB of the prism of refractive index 1.5.Find the angle of the prism A,if the ray just graces the second face AC.(2)



B **C**

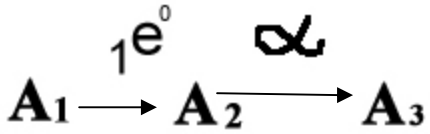
17. Graph shows the variation of stopping potential (Vo) with frequency , v .



(a) Frequency at point **A** is called …… (1 score)
(b) Explain Einstein's photo electric equation **.** (2 score)

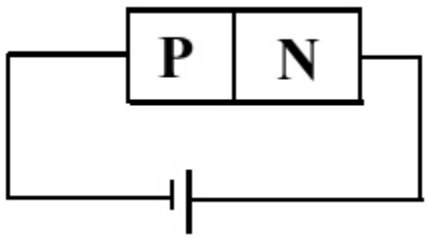
18. In young's double slit experiment, two slits are illuminated by real monochromatic source of light.
(a) Arrive at an expression for bandwidth of interference fringes. (2 score)
(b) If one of the slits is closed , what will be the observation ? (1 score)
(c) What happens to the bandwidth if the experimental arrangement is immersed in water (1 score)

19. a) A nuclear reaction can be given as



In this reaction mass number of A3 is 176 and its atomic number is 71
i. What is the mass number of A1_ ? (½)
ii. What is the mass number of A2 ? (½)
iii. Which of these are isobars ? (1)
b) There are no electrons in the nucleus, still it can eject electrons. Explain. (1)

20. Forward bias of a diode is wrongly given as shown.

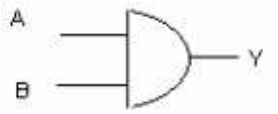


a) Redraw the above circuit correctly (1)
b) Draw the graph of current I and voltage V in forward bias. (1)

21.A transistor in the common emitter mode can be used as an amplifier
a) Design a circuit to amplify an ac signal given in the input region (1)
b) Derive expressions for voltage gain, current gain and power gain in the above transistor configuration (2)
d) "An oscillator is nothing but an amplifier" comment on the statement (1)

22. (a) What is the need of modulation (1)
(b) What are the different type of modulation of sinusoidal carrier wave. (1)

23. Name the gate given below and draw its truth table .



(1 score)