old course F.Y.B.Sc. - Physics - II A.T.K.T old Phy-II

Q.P. Code:- SC2P020316X Sem-II 2015-16 PG-2 25

28/3/16

Note : 1) All the questions are compulsory.

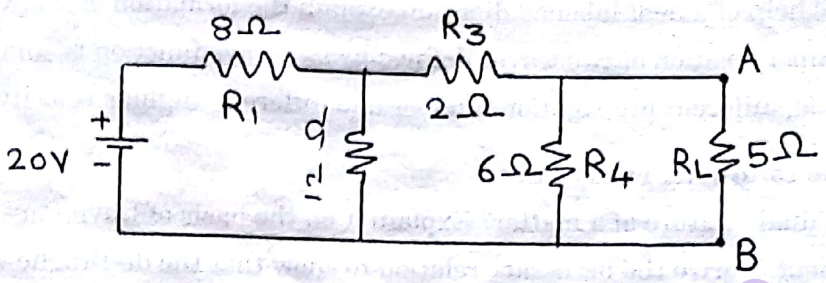
2) Figures to the right indicates full marks.

3) Draw neat diagram wherever necessary.

4) Use of log - table or Non - programmable calculator is allowed.

Q. 1 A) Answer the following : (any one) 8

(i) Use Thevenin theorem and determine the load current for the circuit shown in following diagram.



(ii) Describe the ballistic galvanometer of a suspended type and give theory of its working

B) Answer the following : (any one) 7

(i) Can you determine the power factor and the Q_1 factor of a coil using a suitable ac bridge? Explain.

(ii) State and explain maximum power transfer theorem.

C) Answer the following : (any one) 5

(i) De Sauty's capacitance bridge has $R_1 = 800\Omega$, $R_2 = 1000\Omega$ and $C_2 = 0.22\mu F$. Find the value of the other capacitor when the bridge is balanced.

(ii) A B.G. has a steady deflection of 150mm for a current of 0.3μA at a distance of 1 meter it completes 10 oscillations in 62.8 sec. Find its current and charge sensitivities. What should be the undamped throw. When a charge of 0.15 m circulates through the B.G.?

Q. 2 A) Answer the following : (any one) 8

(i) What do you understand by Nuclear magnetic resonance? Mention its applications.

(ii) What is 'radioactivity'? Explain the five kinds of radioactivity with suitable examples.

B) Answer the following : (any one) 7

(i) Justify the statement that, "Carbon dating an archaeological time scale". Define half - life of a radio active element.

(ii) Write a note on nuclear size and nuclear spin. Hence show that the radius of an atomic nuclei is, $R = R_0 A^{1/3}$

P.T.O.

C) **Answer the following : (any one)** 5

(i) Using the given data find the B.E. of neutron in the $^{7}_{3}Li$ nucleus. Express it in MeV and joules Given - $^{7}_{3}Li$ = 7.016004, $^{6}_{3}Li$ = 6.015125 and $_{0}n^{1}$ = 1.008665.

(ii) In a store 10mg of a radioadctive sample is kept for 4 years. A radioactive sample has half life time of two years. Find how much of the material unchanged?

Q. 3 A) Answer the following : (any one) 8

(i) Explain the experimental demonstration of the compton effect and show that its energy is, $h\upsilon_0 = \frac{h\upsilon}{1+\frac{h\upsilon}{moc^2}(1-\cos 0)}$ where symbols have their usual meaning.

(ii) With the help of a neat labelled diagram explain the formation of a wave group formed by the super position of two waves defined by two wave function ψ_1 and ψ_{11} having same amplitude, different propagation number and different angular velocity.

B) Answer the following : (any one) 7

(i) What is dual - nature of a matter? Explain it on the basis of Davisson - Germer experiment. Derive the necessary relation to show that the de-Broglie wave associated with an electron is of the order 1.65A°.

(ii) Write a note on:

(a) Pair production (b) Photons and Gravity

C) Answer the following : (any one) 5

(i) If a Photon has an energy 1KeV, what will be its wavelength and frequency.

(ii) Calculate the certainty with which one can locate the position of an electron, moving with a speed of 500 m/s with an accuracy 0.005%. Given - h = 6.6×10^{-34} J-S, $m = 9.1 \times 10^{-31}$kg

Q. 4 Answer the following : (any three) 15

A) Obtain the condition of balance for maxwell's L/C Bridge.

B) State Thevenin's and Norton's theorem illustrate them with suitable example.

C) If a sample of radium has half - life time of the order 22 years. Find the time taken by a sample to decrease to 10%.

D) Define: Mass defect and Binding energy and Binding energy per nucleon.

E) Calculate the wavelength that is scattered through an angle 180° when a monochromatic X - radiation of wavelength 0.124A° suffers compton shift, from a carbon block.

F) State Heisenberg uncertainty principle relating conjugate variables:

(i) Position and Momentum

(ii) Energy and time

—— The End ——