20771 **M-1**

Sl. No. 1849 **Total No. of Pages : 3**

V Semester B.Sc. Examination, Oct./Nov. - 2018
(Semester Scheme) (Revised New Syllabus)
PHYSICS (Paper - V) (Compulsory Paper - I)
Spectroscopy and Electronics

Time : 3 Hours **Max. Marks : 60**

Instruction : ***Answer any three questions from part A, three questions from part B and six questions from part C.***

PART-A

1. a) Describe with theory the determination of charge of an electron by Millikan's oil drop method. **[8]**

   b) Discuss the quantum numbers associated with an electron in an atom on the basis of vector atom model. **[4]**

2. a) Describe Stern-Gerlach experiment and discuss the results to verify space quantisation. **[6]**

   b) Explain salient features of rotational, vibrational and electronic spectra of molecules. **[6]**

3. a) Describe the construction and working of C-filter and L-C filter. **[6]**

   b) Explain the effect of temperature on operating point of transistor **[3]**

   c) Distinguish between zener break down and Avalanche break down. **[3]**

4. a) With neat circuit diagram explain the action of two stage R-C coupled amplifier. **[5]**

   b) Distinguish between positive and negative feedback. **[4]**

   c) Write truth table and circuit symbol of XOR gate. Write the Boolean expression for it's output. **[3]**

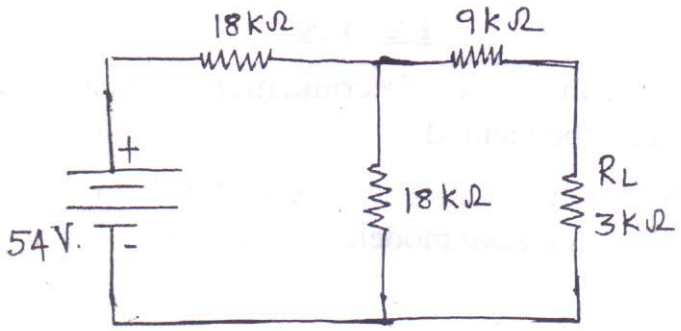
P.T.O.

PART-B

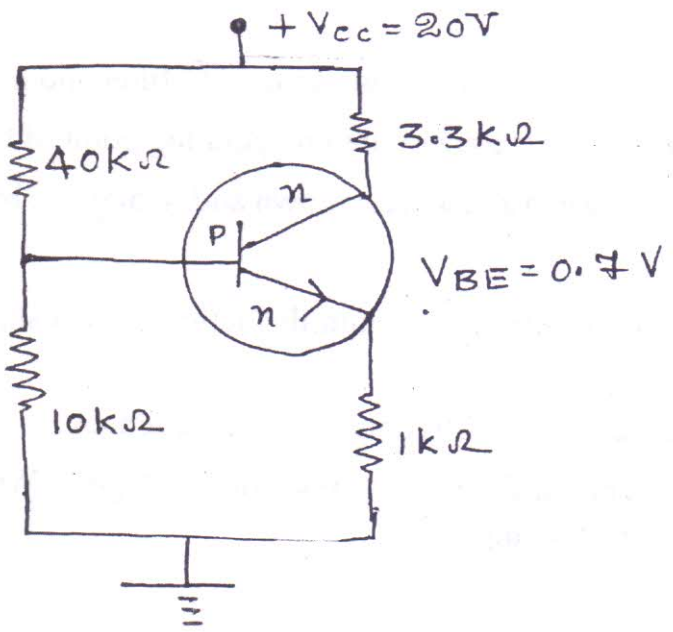
5. Calculate the Zeeman shift observed in normal Zeeman effect in a spectral line of wavelength 550 nm, when subjected to a magnetic field of 0.5T. [4]
[Given e = 1.6×10^{-19}C and m = 9.1×10^{-31}kg]

6. An electron beam is bent in a circle of radius 0.02m by a magnetic field of 4.5×10^{-3}T. Calculate the velocity of the electrons. [4]
Given : charge on the electron : 1.6×10^{-19}C Mass of an electron : 9.1×10^{-31}kg

7. For the network shown in figure, Calculate the load current using Thevenin's theorem. [4]



8. In a given potential divider bias circuit draw the d.c load line and determine Q-point assuming transistor to be silicon. [4]



PART - C

9. a) Write the expression for Bohr Magneton. Explain the symbols. [2]

b) State paulis exclusion principle. [2]

c) What is L-S coupling? Explain. [2]

d) What are stokes and antistokes lines. [2]

e) Write the circuit diagram of zener diode voltage Shunt Regulator. [2]

f) Draw the frequency response curve of R.C. coupled amplifier and write the expression for Band width. [2]

g) State Norton's Theorem. [2]

h) Write the circuit diagram of AND gate using transistor. [2]

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Total No. of Pages : 2

V Semester B.Sc. Examination, Oct./Nov. - 2018

(Semester Scheme) (Revised New Syllabus)

PHYSICS (Paper - VI)

Condensed Matter Physics (Compulsory Paper - II)

Time : 3 Hours **Max. Marks : 60**

Instruction :- *Answer any three questions from Part - A, three questions from Part - B and any six questions from Part - C.*

PART - A

1. a) Write Maxwell - Boltzmann, Bore - Einstein and Fermi - Dirac energy distribution formulae and explain the terms. [4]

   b) On the basis of Einstein's theory obtain an expression for specific heat of solids. [8]

2. a) Using classical theory of free electrons, obtain an expression for the electrical conductivity of a metal and hence derive ohm's law. [7]

   b) What are dielectrics? Explain the method of determining dielectric constant of solids. [5]

3. a) State Bragg's Law. With neat labelled diagram explain construction and working of Bragg spectrometer. [8]

   b) Write down the structure of NaCl and KCl crystals. [4]

4. a) Explain Meissner effect, critical magnetic field and persistant current in superconductors. [6]

   b) Explain : [6]

      i) Laser induced fusion

      ii) Laser soldering

      iii) Laser heat treatment

P.T.O.

PART - B

5. Two solids are at Debye's temperature 600 k and 1200 k. Calculate the ratio of their specific heats. [4]

6. A specimen of thickness 0.4 mm and charge concentration 2×10^{23} m^{-3} is used in the Hall effect experiment. If the Hall voltage developed is 3μv for a current density of 250 Am^{-2}, calculate the applied magnetic flux density. [4]

7. Calculate the number of free electrons per unit volume in copper assuming Fermi energy of copper to be 7.04 ev

   (Given h = 6.624×10^{-34} J - S mass of electron = 9.1×10^{-31}kg) [4]

8. X - rays with $\lambda = 1$ Å are scattered from a carbon block. The scattered radiation is viewed at 90° to the incident beam. What is the compton shift.

   Given : rest mass of electron = 9.1×10^{-31}kg [4]

PART - C

9. a) Write any two characteristics of covalent bond in crystals. [2]

   b) State Dulong and Petit's law. [2]

   c) Write the expression for number of the available energy states between E and E+dE. [2]

   d) What is the influence of external agents on superconductivity. [2]

   e) Distinguish between monoclinic and triclinic crystals. [2]

   f) What is LIDAR? Explain. [2]

   g) State Weidman - Franz law. [2]

   h) State Moseley's law. [2]

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Sl.No. 1079 Total No. of Pages : 2

V Semester B.Sc. Examination, October/November - 2018

(Semester Scheme) (Revised New Syllabus)

PHYSICS (Paper - VII) (Elective Paper - I)

Solid State and Semiconductor Physics

Time : 3 Hours **Max. Marks : 60**

Instruction :- *Answer any Three questions from Part - A, any Three questions from Part - B and any Six questions from Part - C.*

PART - A

1. a) Write a short note on "liquid crystal phases". [6]

   b) Discuss in detail, the electronic polarisation of dielectrics with appropriate mechanisms. [6]

2. a) Classify the magnetic materials with suitable examples and compare their properties. [5]

   b) Distinguish between Schottky and Frankel imperfections. [4]

   c) State and explain Curie - Weiss Law. [3]

3. a) Deduce the expression for the hole concentration in an intrinsic semiconductor, at thermal equilibrium. [6]

   b) Obtain the expression for drift current, diffusion current and Total current in a semi conductor. [6]

4. a) Arrive at the expression for the Fermi level in a p-type extrinsive semiconductor. [6]

   b) Give the details of the construction and working of LED. [6]

P.T.O.