Text Book of Organic Chemistry: P. L. Soni.

6. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji S. P. Singh and R.P.Kapoor, Wiley Eastern Ltd (New Age International)

7. Organic Chemistry, Morrison & Boyd, Prentic Hall.

8. Organic Chemistry (Hindi Ed.):Suresh Ameta, P B. Punjabi and B. K Sharma, Himanshu Pub.

PAPER III

PHYSICAL CHEMISTRY

Time-3 Hrs. **M.M. 50**

NOTE : The paper will be divided into THREE sections.

Section-A Ten questions (short type answer) two from each Unit will be asked. Each question will be of half mark and the candidates are required to attempt all questions.

Total 5 marks

Section-B Five questions (answer not exceeding 250 words) one from each Unit with internal choice will be asked and the candidates are required to attempt all questions. Each question will be of 5 marks.

Total 25 marks

Section-C Four questions may be in parts covering all the five Units (answer not exceeding 500 words) will be asked. The candidates are required to attempt any **TWO** questions. Each question will be of 10 marks.

Total 20 marks

UNIT - I

Mathematical Concepts - Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of function like k_x, e^x, x^n, sin x, log x, maxima and minima, partial differentiation and

reciprocity relations, integration of some useful/ relevant functions, permutations and combinations, factorials, probability.

Computers - General introduction to computers, different components of a computer, hardware and software, input-output devices, binary numbers and arithmetic, introduction to computer languages, programming operating systems.

UNIT - II

Gaseous State - Postulates of kinetic theory of gases, deviation from ideal behavior, Van- der Waals equation of state.

Critical Phenomena - PV isotherms of real gases, continuity of states, the isotherms of Van der Waals equation, relationship between critical constants and Van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities - Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, liquefaction of gases (based on Joule - Thomson effect).

Liquid State - Intermolecular forces, structure of liquid (a qualitative description).

Liquid Crystals - Difference between liquid crystal, solid and liquid, classification, structure of smetic, nematic and cholestric phases, theory of liquid crystals and its applications, thermography and seven segments cell.

UNIT-III

Solid State - Definition of space lattice, unit cell, Bravias lattices.

Laws of crystallography- (i) Law of constancy of interfacial angles (ii) Law of rationality of indices, Weiss and Miller indices (iii) Law of symmetry, symmetry elements in crystals, classification of crystals, X-ray diffraction by crystals, derivation of Bragg equation, determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Colloidal State - Definition of colloids, classification of colloids.

Solids in liquid (sols): Properties - kinetic, optical and electrical, stability of colloids, protective action, Hardy - Schulze law, gold number.

Liquids in Liquid (emulsions): Types of emulsions, preparation, emulsifier,

Liquids in solid (gels)- classification, preparation and properties, inhibition, general applications of colloids.

UNIT- IV

Nuclear and Radiochemistry - Elementary idea of nucleus, nuclear forces, packing fraction, mass defect and binding energy, nuclear fission and fusion reactions, calculation of Q - values of nuclear reactions, liquid drop and shell models of nucleus, theory of radioactivity, G. M. Counter, half life period, average life, radioactive disintegration, radioactive steady state, group displacement law, radioactive