

Master of Science (Physics)
Third Semester Main Examination, Dec-2020
Atomic and Molecular Physics-II (MSP303T)

Time: 3:00 Hrs**Max Marks 85**

Note: Attempt all questions. Question no 1 to Question no. 5 has 2 parts. Part A is 10 marks and part B is 7 marks.

- Q.1 (a) Explain the application of NMR techniques.
 (b) Write the interaction between nuclear spin and magnetic field.
 OR
 (a) Explain the relaxation process spin-spin interaction.
 (b) Explain the brief spin-spin coupling between two and more nuclei.
- Q.2 (a) Explain frank condom principles.
 (b) What do you mean by dissociation and pre-dissociation?
 OR
 (a) Explain Vibrational course structure of electronic spectra.
 (b) Write short note on frank condom factor.
- Q.3 (a) Explain molecular polarisibility in Raman effect.
 (b) What is difference between Raman and infrared spectroscopy.
 OR
 (a) Explain Raman spectra of diatomic molecules.
 (b) Write the application of Raman effect.
- Q.4 (a) What are the principle of Massbauser Spectroscopy?
 (b) What do you mean by gamma emission.
 OR
 (a) Explain Linc width.
 (b) Write the application of Massbauser Spectroscopy.
- Q.5 (a) Explain hyper fine coupling.
 (b) What do you mean by ESR.
 OR
 (a) Explain:-
 (i) G- Values
 (ii) An Isotropic system
 (b) What are the principle of ESR spectrometer.

Master of Science (Physics)
Third Semester Main Examination, Dec-2020
Condensed Matter Physics (MSP301T)

Time: 3:00 Hrs**Max Marks 85**

Note: Attempt all questions. Question no 1 to Question no. 4 has 2 parts. Part A is 10 marks and part B is 7 marks.

- Q.1 (a) Explain Bravis Lattice in two and three dimension.
 (b) Explain sodium chloride crystal structure.

OR

- (a) Explain crystal diffraction by XRay.
- (b) Explain zinc blende structure..

- Q.2 (a) Explain Brillouin Zones in details. .
(b) Explain Bragg diffraction condition in terms of reciprocal lattice vector.

OR

- (a) Show relation between crystal lattice axes and crystal reciprocal lattice axes.
- (b) Explain diamond structure in details.

- Q.3 (a) Explain different types of stress and strain components.
(b) Explain elastic compliance and stiffness constants.

OR

- (a) Describe experimental determination of elastic constants.
- (b) Explain elastic constant for cubic isotropic.

- Q.4 (a) Explain lattice dynamic of a diatomic linear lattice.
(b) Explain lattice vibrational spectrum.

OR

- (a) Describe the concept of phonons and its momentum.
- (b) Describe inelastic scattering of photons by phonons.

- Q.5 Write a short notes on (Any four)- (3.5×4)=17 (a) Band theory of solids.

- (b) De Hass Van Alphen effect
- (c) Magneto resistance
- (d) Anomalous skin effect
- (e) Fermi surfaces
- (f) Thermal conductivity

Enrollment No.....

Master of Science (Physics)
Third Semester Main Examination, Dec-2020
Digital Electronics (MSP304T)

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions. Question no 1 to Question no. 4 has 2 parts. Part A is 10 marks and part B is 7 marks.

- Q.1 (a) Solve using 2's complement.
(i) $101101 - 011100$
(ii) $11001 - 010$
(iii) ECB110
(b) Do as directed.
(i) $(279)_{10}$ to binary and octal no. system.
(ii) $(01101)_2$ to decimal and hexadecimal no.

OR

- (a) Explain Signed and unsigned binary number with example.
- (b) Convert as directed.
(i) Add $(A3E)_{16}$ to $(12B)_{16}$
(ii) $(10101011)_2$ binary to $(?)_8$ octal
(iii) $(39)_{10}$ decimal to $(?)$ binary

- Q.2 (a) State and explain De-Morgan's theorem with example.
(b) Explain gray code. Outline the procedure for converting the binary number $(11011011)_2$ to its equivalent gray code ?

OR

- (a) Minimize the following logic function using K-map.
 $\sum m(1, 3, 5, 8, 11, 15) + d(2, 7)$
(b) Draw the symbols and truth table for following gates.
(i) AND (ii) OR (iii) NOR (iv) NAND

- Q.3 (a) What do you mean by shift register ? Draw and explain 4 bit shift register.
(b) Explain multiplexer in detail.

OR

- (a) What is race around condition and how it is eliminated ?
(b) Explain master – slave flip-flop in detail.

- Q.4 (a) Explain ripple counter with suitable diagram. Give the truth table and timing diagram also.

- (b) Explain ring counter in detail.

OR

- (a) Design a synchronous 4-bit up-down counter.
(b) Explain BCD counter in detail.

- Q.5 Write a short notes on: (any 4) (Marks 17)

- (a) R-2R ladder network
(b) Binary weighted register
(c) Successive approximation ADC
(d) De multiplexer
(e) D flip-flop

Enrollment No.....

Master of Science (Physics)
Third Semester Main Examination, Dec-2020
Nuclear and Practice (MSP302T)

Time: 3:00 Hrs

Max Marks 85

Note: Attempt all questions. Question no 1 to Question no. 5 has 2 parts. Part A is 10 marks and part B is 7 marks.

- Q.1 (a) Explain low-energy n-p scattering.
(b) What do you mean by exchange & Tensor forces?

OR

- (a) Explain Spin dependence of n-p forces.
(b) What are compound nuclear reaction?

- Q.2 (a) Describe the construction and working of a cyclotron. Discuss its limitations.
(b) What do you mean by LINAC?

OR

- (a) Explain Betatron?
(b) Define phase stability.

- Q.3 (a) Explain the postulates of the liquid drop model. Give a simple derivation of semi-empirical mass formula.
(b) Define nuclear quadrupole moment.

OR

- (a) What is magic number? Explain shell model of the nucleus.
(b) What do you mean by spin orbit interaction?

- Q.4 (a) What are the general features of β -ray spectrum?
(b) Explain multipole radiation.

OR

- (a) Explain fermi theory of β -decay.
(b) What do you mean by nuclear isomerism?

- Q.5 (a) Explain symmetry and conservation laws.
(b) Write brief classification of elementary particles.

OR

- (a) What do you mean by fundamental interaction?
(b) Define symmetry schemes of elementary particles.