(DPHY 01 (NR))

M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER 2012.

First Year

Physics

Paper I — MATHEMATICAL PHYSICS

Time : Three hours Maximum : 80 marks

Answer any FIVE questions.

1. (a) Obtain the series solution of Legendre polynomial.

   (b) From the generating function of Lagurre polynomial prove

   $(n+1)L_{n+1}(x)-(2n+1-x)L_n(x)-n\,L_{n-1}(x)=0$.

2. (a) Obtain the two fundamental recurrence relations of Hermite polynomial.

   (b) Evaluate the value of $J_{\pm\frac{3}{2}}(x)$ and $J_{\pm\frac{5}{2}}(x)$.

3. (a) State and prove Cauchy's integral theorem.

   (b) Using this theorem evaluate

   $\oint_C \frac{dz}{z}$ where C is a simply closed curve.

4. (a) State and explain Laurent's theorem.

   (b) Find the Taylor's series for the function $\frac{1}{1+z}$ about $z=1$.

5. (a) Define tensor. Distinguish between contravariant and covariant tensors.

   (b) Explain the terms symmetric and skew symmetric tensors.

6. (a) Explain the quotient law of tensor.

   (b) Give the transformation laws of Christoffel symbols.

7. (a) Derive Laplace transform of a derivative.

   (b) Find the inverse LT of $\frac{1}{s^2\left(s^2+a^2\right)}$.

8. (a) Bring out the relation between Fourier transform and Laplace transform.

   (b) Explain half-wave expansions in Fourier series.

9. Answer any TWO of the following :

   (a) Derive an equation for Bessel function.

   (b) Explain Jordan's inequality.

   (c) Special Cartisian tensors.

   (d) FT of detta function.

(DPHY 02 (NR))

M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER 2012.

First Year

Physics

Paper II – CLASSICAL MECHANICS AND STATISTICAL MECHANICS

Time : Three hours Maximum : 80 marks

Answer any FIVE questions.

All questions carry equal marks.

1. (a) State the D' Alembert's principle and obtain Lagrange's equation from it.

   (b) State and explain principle of least action.

2. (a) What do you understand by the independent coordinates of a rigid body?

   (b) Explain the coriots force and its significance.

3. (a) State and explain the fundamental postulator of spetial theory of relativity and obtain Lorentz transformations.

   (b) Explain conanical transformation with examples.

4. (a) What are action angle variable? Illustrate the use of such variables to the problems of Kepler's laws.

   (b) Formulate the theory of small oscillations.

5. (a) State and explain equi-partition theorem.

   (b) What is Gibb's paradox? Explain how it has bean resolved.

6. (a) Explain the energy fluctuations in canonical ensemble.

   (b) Obtain the equivalence between the canonical ensemble and grand canonical ensemble.

7. (a) Explain the postulate of quantum statistical mechanics.

   (b) Discuss the Darwin–Fowler method for finding the partition function.

8. (a) Obtain an expression for the internal energy of an ideal fermi gas.

   (b) Explain Bose–Einstein condensation.

9. Write notes on any TWO of the following :

   (a) Hamilton's principle.

   (b) Canonical invariance.

   (c) Density punctuations in the grand canonical ensemble.

   (d) Theory of white–dwarf.

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(DPHY 03 (NR))

M.Sc. (Previous) DEGREE EXAMINATION, DECEMBER 2012.

First Year

Physics

Paper III — QUANTUM MECHANICS

Time : Three hours Maximum : 80 marks

Answer any FIVE questions.

1. (a) Explain the basic postulates of quantum mechanics.

   (b) Explain Dirac's bra and ket notations and mention its properties.

2. (a) State and explain uncertainty principle.

   (b) Obtain the solutions of wave equation for a particle moving in one dimension in a constant potential field with finite walls.

3. (a) Explain the time dependent perturbation theory.

   (b) Obtain Einstein probabitition based on this theory.

4. (a) Define panti's spin matrices. State and prove their properties.

   (b) Explain Clesback-Gordon coefficients.

5. (a) What is angular momentum? Explain the commutation rules between them.

   (b) Obtain the eight values for L^2 and Lz.

6. (a) Explain schrodinger's and Heisenberg's pictures.

   (b) Obtain the equation of motion for schrodinger's picture.

7. (a) Explain the physical significance of negative energy states.

   (b) Obtain the Dirac's relativistic evaluation for a free particle.

8. Write a note on any TWO of the following

   (a) Ortho normality of Eigen functions.

   (b) WKB method.

   (c) Wigner-Eckart theorm.

   (d) Dirac matrices.

(DPHY 04) (NR)

M.Sc (Previous) DEGREE EXAMINATION, DECEMBER 2012.

First Year

Physics

Paper IV –ELECTRONICS

Time : Three hours Maximum : 80 marks

Answer any FIVE questions.

All questions carry equal marks.

1. (a) Explain briefly the method of CMRR measurement in a op-amp.

   (b) Derive an expression for gain in inverting amplifier using op-amp.

2. (a) With a neat circuit diagram, explain the working of phase shift oscillation.

   (b) Explain the working of IC regulated power supply.

3. (a) Explain the TEM wave in the coaxial line resonant cavities.

   (b) Discuss the working of microwave resonators.

4. (a) Explain the production of FM waves.

   (b) With a neat diagram explain the working of Foster-seeley discriminator.

5. (a) State and explain De Morgan's theorems.

   (b) Explain the operation of 8-bit multiplexer.

6. (a) Explain the working of JK-flip-flop with a necessary diagram.

   (b) Explain the operation of shift register.

7. (a) Explain the addressing modes of 8085 up.

   (b) Write an a memory language program to add two 8 bit numbers.

8. (a) Explain the architectural diagram of 8086 up and explain each part in detail.

   (b) Discuss the instruction set of 8086 up.

9. Write notes on any TWO of the following.

   (a) Class B pushfull power amplifier.

   (b) Magic T

   (c) Super heterodyne receiver.

   (d) A/D and D/A Converters
