(DPHY01)

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M.Sc. (Previous) DEGREE EXAMINATION, DEC. – 2016

First Year

PHYSICS

Mathematical Physics

Time : 3 Hours **Maximum Marks : 70**

Answer any Five questions
All questions carry equal marks

Q1) Obtain the series solution of Legendre polynomial.

Q2) a) From generating function show that $H_{n-1}(x) + H_{n+1}(x) = \frac{2n}{x} H_n(x)$.

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

Q3) a) Prove that $u = e^{-x}(x\sin y - y\cos y)$ is harmonic.

b) Explain Cauchy's integral theorem.

Q4) a) Explain Morera's theorem.

b) State and prove Laurent's theorem.

Q5) a) Mention different types of tensors.

b) Prove that Kronecker delta is a mixed tensor

Q6) a) Explain Quotient law of tensor.

b) Explain the Laplacian operator in Riemann space.

Q7) a) Explain partial fraction method for inverse LT.

b) Find the LT of

i) $t^2 + at + b$ and

ii) $\sinh^2 2t$

Q8) a) Find the fourier series for $f(x)$ in the interval $(-\pi, \pi)$ where

$$f(x) = \pi + x, \ -\pi < x < 0$$
$$= \pi - x, 0 < x < \pi$$

b) Explain FT of delta function.

Q9) Write notes on any two of the following

a) Prove $L_{n+1}(x) = (2n + 1 - x)L_n(x) - nL_{n-1}(x)$

b) Jordon's inequality

c) Christoffel's symbols

d) LT of derivative

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(DPHY02)

Total No. of Questions : 09] **[Total No. of Pages :02**

M.Sc. (Previous) DEGREE EXAMINATION, DEC. – 2016

First Year

PHYSICS

Classical Mechanics and Statistical Mechanics

Time : 3 Hours **Maximum Marks : 70**

Answer any Five questions
All questions carry equal marks

Q1) a) Explain the principle of virtual work.

b) State and explain D'Alembert's principle.

Q2) a) Obtain the Lagrange's equation from Hamilton's principle.

b) Explain the principle of least action.

Q3) a) What are canonical transformations? Give condition for a transformation to be canonical.

b) Obtain canonical equations of motion in Poisson bracket netation.

Q4) a) Explain Hamilton – Jacobi theory.

b) Discuss the free – vibration of a linear triatomic molecule.

Q5) a) State and explain equipartition theorem.

b) What is Gibb's paradox? Explain.

Q6) a) Define an ensemble and distinguish canonical and grand canonical ensembles.

b) Explain the density fluctuations in the grand canonical ensemble.

Q7) a) Explain the significance of partition function in quantum statistical mechanics.

b) Explain variational principle.

Q8) a) Explain the Theory of White dwarf.

b) Explain Bore – Einstein condensation.

Q9) Write notes on any Two of the following

a) Cyclic coordinates

b) Action – angle variables

c) Postulates of quantum statistical mechanics

d) Darwin – Fowler method

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(DPHY03)

Total No. of Questions : 08] **[Total No. of Pages :02**

M.Sc. (Previous) DEGREE EXAMINATION, DEC. – 2016

First Year

PHYSICS

Quantum Mechanics

Time : 3 Hours **Maximum Marks : 70**

Answer any Five questions
All questions carry equal marks

Q1) a) Explain the difference between classical mechanics and quantum mechanics.

b) What is wave function? Explain its physical interpretation.

Q2) Obtain the solution of wave equation for a particle moving in three dimensions in a constant potential field with finite walls.

Q3) a) Briefly explain the time independent perturbation theory for non – degenerate systems.

b) Explain the variation method.

Q4) a) Write a note on sudden and adiabatic approximation.

b) Briefly explain Generalized perturbation theory.

Q5) a) Obtain the commutation relations of L, L_x, L^2 and L_z.

b) Explain Paulis spin matrices.

Q6) a) What are CG coefficients? Explain.

b) Distinguish between Schrodinger's and Heisenberg's pictures.

Q7) a) Obtain the free particle solution by Dirac matrices.

b) Write a note on probability and current densities.

Q8) Write a note on any two of the following :

a) Uncertainty principle

b) Stark effect in hydrogen atom

c) Wigner – Eckail Theorem

d) Negative energy states.

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(DPHY04)

Total No. of Questions : 9] **[Total No. of Pages :02**

M.Sc. (Previous) DEGREE EXAMINATION, DEC. – 2016

First Year

PHYSICS

Electronics

Time : 3 Hours **Maximum Marks : 70**

Answer any Five questions

Q1) a) Explain how op.amp can be used as inverting amplifier.

b) What is feedback? Explain the effect of feed back on closed loop gain.

Q2) a) Explain the principle and working of phase shift oscillator with circuit diagram.

b) Discuss the generation of square wave by using 555 times.

Q3) a) Explain the propagation of TM and TR waves in the rectangular guides.

b) Write a note on magic T attenuators.

Q4) a) Explain the working of Faster Seeley discrimination.

b) Explain about ground wave and space wave propagation.

Q5) a) State and prove demorgan Theorems.

b) Define NAND, NOR and Exclusive OR gates and give their truth tables.

Q6) a) Draw a matter slave flip – flop and explain its operation.

b) Distinguish between synchronous and asynchronous counters.

Q7) a) Explain the architecture of 8085.

b) Write a assembly language program to add two, 8 bit numbers.

Q8) a) Explain the addressing modes of 8086 with examples.

b) What is an instruction cycle? Explain how these cycles are calculated in execution.

Q9) Write notes on any TWO of the following questions.

a) Weinbridge oscillator

b) Magnetron

c) D flip flops

d) Sample and hold circuit

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