

Sessional Examination, 2018
5th semester, Physics (M)
Paper: 501

Time: 45 mins

Total Marks: 15

Answer any three of the following. Each question carries 5 marks and all the symbols have their usual meaning.

1. Define a central force. Show that the areal velocity of a reduced mass moving under influence of a central force is a constant.
2. What are the generalized co-ordinates? Deduce D'Alembert's principles by virtual work.
3. Obtain the Laurent's expansion of $f(z) = \frac{1}{z^2-3z+2}$ in the region
(a) $|z| > 2$ (b) $0 < |z-1| < 1$
4. Prove that,

$$f^n(z_0) = \frac{n!}{2\pi i} \int_C \frac{f(z) dz}{(z - z_0)^{n+1}}$$

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Answer any three of the following. Each question carries 5 marks and all the symbols have their usual meaning.

1. Describe the Vector model of the atom.
2. What do you mean by critical potential? Explain excitation and ionization potential.
3. Define magnetic moment of atom. What do you mean by gyro-magnetic ratio?
4. Write short notes on,
(a) L-S coupling
(b) J-J Coupling

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Answer any three of the following. Each question carries 5 marks and all the symbols have their usual meaning.

1. Write the short notes on the any two of the following,
 - a) Red Giant
 - b) Supernova
 - c) Protostar
2. (a) What is spectral classification of star? Mention the surface temperature range of O, B, K type star?
(b) A star is at a distance of 4pc. Its apparent magnitude is 2. Calculate its absolute magnitude.
3. Derive a relation between group velocity and phase velocity.
4. What is a wave function? Derive an expression for time dependent Schrodinger equation.

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Answer any three of the following. Each question carries 5 marks and all the symbols have their usual meaning.

1. Use the truth table to verify the following identities,
 - a) $\bar{A} + B = \bar{A}.B$
 - b) $A + BC = (A + B)(A + C)$
2. Design a logic circuit whose output is given by the Boolean expression,
$$Y = \bar{A}BC + A\bar{B}C + ABC\bar{C}$$
3. a) Find the decimal equivalent of the 6 bit binary number.
b) Convert 11001_2 to its equivalent decimal number.
4. a) The total power content of an AM wave is 1320 W. What is the percent modulation if each sideband contains 160 W.
b) what is the modulation index of an FM carrier having a carrier swing of 120KHz and a modulating signal of 10 KHz.