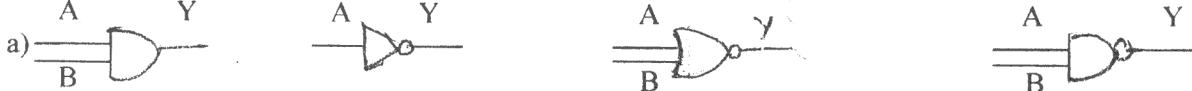


END OF SEMESTER EXAMINATIONS, APRIL / MAY 2017

ALLIED PHYSICS - II
SUBJECT CODE: 16UBPH02MAJOR: B.Sc. MATHS
TIME : 3 HOURSSEMESTER : II
MAX.MARKS: 75**SECTION - A (10 X 1 = 10)****Answer ALL Questions:****Choose the best answer:**

- atom model is known as the relativistic atom model.
a) T.T. Thomson's b) Bohr's c) Sommerfeld's d) Vector
- The total angular momentum quantum number is given by
a) $\vec{j} = \vec{\ell} \pm \vec{s}$ b) $\vec{\ell} = \vec{j} + \vec{s}$ c) $\vec{s} = \vec{j} + \vec{\ell}$ d) $\vec{j} = \vec{s} \pm \vec{\ell}$
- The proposed wavelength for the matter waves is given by
a) $\lambda = p / h$ b) $\lambda = h / p$ c) $\lambda = hm / v$ d) $\lambda = hv / m$
- The diffraction pattern produced by electron beam demonstrates that electrons behave as
a) charged particles b) negatively charged particles c) positively charged particles d) waves
- forces are charge independent forces.
a) Nuclear b) Coulombic c) Attractive d) Repulsive
- ${}_6\text{C}^{12} + a \rightarrow {}_7\text{N}^{13} + b$ is the transmutation reaction by
a) neutron b) proton c) α particle d) deuteron
- A properly doped semiconductor diode which has a sharp breakdown voltage is known as a -----
a) Junction diode b) Zener diode c) Photodiode d) LED
- In the inverting amplifier, when the non-inverting terminal is grounded, the inverting terminal is said to be at
a) summing point b) differential point c) virtual ground d) open loop
- The logic symbol of NAND gate is

- The associative law for addition using Boolean Algebra is
a) $A + (B + C) = (A + B) + C$ b) $A + B = B + A$ c) $A (B + C) = AB + AC$ d) $AB = BA$

SECTION - B (5 X 4 = 20)**Answer ALL Questions:**

- Obtain the expression for total energy of an electron using Sommerfeld's theory.
(OR)
 - State and explain Pauli's Exclusion Principle.
- Find the kinetic energy of a proton whose de Broglie wavelength is 1×10^{-15} m.
(OR)
 - State and explain Heisenberg's Uncertainty principle with example.

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13. a) Mention the characteristics of Nuclear forces.
(OR)
b) Briefly discuss about elementary particles.
14. a) Discuss the principle and working mechanism of a LED.
(OR)
b) Draw the choke filter and explain its action.
15. a) State and prove De Morgan's theorems.
(OR)
b) Show that $\overline{\overline{A} \cdot B + A \cdot \overline{B}} = \overline{A} \cdot \overline{B} + A \cdot B$.

SECTION – C (5 X 9 = 45)

Answer ALL Questions:

16. a) Discuss the quantum numbers associated with the vector atom model.
(OR)
b) Give the demerits of Bohr's and sommerfeld's atom models and discuss the vector atom model that overlooks both the theories.
17. a) (i) Show that the de Broglie wave velocity must be greater than c, the velocity of light. (4 marks)
(ii) Prove that the de Broglie group velocity associated with a moving particle travels with the same velocity as the particle. (5 marks)
(OR)
b) Describe G.P. Thomson's experiment on the diffraction of electrons and discuss the results.
18. a) Describe liquid drop model for nuclear structure and explain the semi-empirical mass formula in detail.
(OR)
b) Explain in detail with suitable reactions:
(i) Artificial transmutation by protons (4 marks)
(ii) Artificial transmutation by deuterons (5 marks)
19. a) Describe the working of an OpAmp differentiator with the necessary circuit and explain the response for a square wave input.
(OR)
b) With the suitable circuit diagram, explain the working of an OpAmp integrator and discuss the response for a square wave input.
20. a) Discuss how NAND gate acts as a Universal gate.
(OR)
b) Simplify using Karnaugh map:
 $Y = F(A, B, C, D) = \sum (0, 1, 3, 5, 7, 9, 11, 12, 13, 14, 15)$
