Sub Code: BSCT 102 / BSCT 202 **ROLL NO……..……..**

Ist & 2nd SEMESTER EXAMINATION, 2022 – 23

Ist year, B.Tech –Computer Science Engineering & Information Technology

Physics

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any **four** parts of the following. a) Write down de Broglie hypothesis. Name the experiment which verifies it. b) Draw the voltage current characteristics of p-n junction diode. c) State and explain Heisenberg's uncertainty principle. d) Write down the postulates of free electron theory of metals. e) Differentiate between spontaneous and stimulated emission of radiation. f) Write the important findings of photoelectric effect experiment.	5x4=20
Q 2.	Answer any **four** parts of the following. a) Write down the properties of a well behaved wave function. b) Differentiate between indirect and direct band gap semiconductors c) Define Fermi Energy. What is the position of the Fermi level in intrinsic, *n-type* and *p-type* semiconductor? d) State and explain Fermi Golden rule in atomic excitation processes. e) Define photovoltaic effect. Draw *I-V* characteristics for a solar cell. f) Explain the concept of quantum confinement in nano materials.	5x4=20
Q 3.	Answer any **two** parts of the following. a) Derive following relationship for the wavelength of incident and modified *X-ray*, in Compton scattering experiment $$\Delta\lambda = \lambda' - \lambda = \frac{h}{m_0 c}(1 - cos\phi)$$ where, ϕ is the scattering angle of modified radiation. b) Explain the working of zener diode and tunnel diode. c) Derive the expression for current generated due to drifting of charge carriers in semiconductors in the presence of electric field.	10x2= 20
Q 4.	Answer any **two** parts of the following. a) Differentiate between metal, semiconductors and insulators on the basis of band theory b) Explain four probe method for the measurement of charge density and resistivity of semiconductor materials with neat and clean diagram. c) Derive time independent Schrodinger equation for de Broglie waves.	10x2= 20
Q 5.	Answer any **two** parts of the following. a) Explain the construction and working of light emitting diode (LED). b) A solar mono crystalline solar cell has efficiency of *25%*. If maximum power point (MPP) is found to be *0.22W* with short-circuit current and open-circuit voltage of *0.15 amp* and *1.7 volt*, respectively, what would be the fill factor of the device? What is the input irradiance power? c) Derive the expression for normalized wave for a particle trapped in one dimensional potential box of length *L*.	10x2= 20

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