Register Number:……..

KUMARAGURU
college of technology
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B.E/B.TECH DEGREE EXAMINATIONS: APRIL/ MAY 2024

(Regulation 2018)

Second Semester

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

U18PHT2203: Advanced Physics

COURSE OUTCOMES

CO1: Impart knowledge on the concepts of electrodynamics for various conditions and its applications.

CO2: Understand the behavior of magnetostatics conditions, materials and its applications.

CO3: Study the importance of various operators and its application in quantum computing.

CO4: Infer the nuclear reactions and its impact in energy models for data processing.

CO5: Explore the types of high energy particles and its characteristic effects.

CO6: Understand the various materials aspects for identify modelling using various tools.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Infer Maxwell's displacement current.	CO1	[K_1]
2.	Define Electric Polarization.	CO1	[K_2]
3.	Compare soft and hard magnetic materials.	CO2	[K_1]
4.	State the significance of the Hamiltonian operator in quantum mechanics.	CO3	[K_1]
5.	Define packing factor.	CO4	[K_2]
6.	What is a mass defect?	CO4	[K_1]
7.	Outline the concept of antiparticles.	CO5	[K_2]
8.	What are seven crystal systems?	CO6	[K_1]
9.	Define the Reciprocal lattice.	CO6	[K_2]
10.	Differentiate classical and quantum computing.	CO3	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	**Scenario:** A satellite communication system requires the precise calculation of the electromagnetic wave propagation in the ionosphere, which has varying dielectric properties.				
	a)	Derive the maxwells wave equation for electromagnetic waves in a dielectric medium.	7	CO1	[K_3]
	b)	Discuss the impact of the varying dielectric constant on wave propagation.	7	CO1	[K_3]
	c)	Justify, how Maxwell's equations are used in this context.	2	CO1	[K_2]
12.	The development of a new MRI imaging system relies on understanding the magnetic properties of different tissues and optimizing the magnetic field strength.				
	a)	Explain the concept of magnetic permeability and its importance in MRI.	7	CO2	[K_3]
	b)	Examine the imaging aspects of MRI	7	CO2	[K_3]
	c)	Justify significance of magnetic materials used in MRI.	2	CO2	[K_2]
13.	a)	Discuss the role of spin-orbit computing in quantum mechanics.	7	CO3	[K_2]
	b)	Explain Simon's Algorithm and its significance in quantum computing.	7	CO3	[K_2]
	c)	Identify the properties of Qubits in Physical system.	2	CO3	[K_1]
14.	a)	Describe the concept of nuclear binding energy and its importance in stability.	7	CO4	[K_3]
	b)	Evaluate the stability factors of different nuclei using the mass defect and packing factor.	7	CO4	[K_2]
	c)	State the principle of a particle accelerator.	2	CO4	[K_2]
15.	a)	Illustrate the quark model and its application in particle physics	7	CO5	[K_3]
	b)	Analyze the symmetry functions in high energy particle physics.	7	CO5	[K_2]
	c)	List out the properties of antiparticles.	2	CO5	[K_2]
16.	a)	Discuss the significance of defects and imperfections in crystal systems.	7	CO6	[K_3]
	b)	Explain the chemical bonding interactions in crystalline materials.	7	CO6	[K_2]
	c)	Define plane and space groups in crystals.	2	CO6	[K_1]

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