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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR
25PH28BS202

I B. Tech II Semester Regular Examinations, June - 2026

ADVANCED ENGINEERING PHYSICS

(Common to CSE, IT & CSE(DS))

Time: 3 Hours**Max. Marks: 60**

Note: Question paper consists of Part-A & Part-B.

i) **Part-A** for 10M, ii) **Part-B** for 50marks

- Part A** is compulsory, consisting of 5 sub questions from all units carrying equal marks.
- Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10 marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A (10Marks)			
Q. No	Questions	Marks	BTL
1.a)	Compare SC, BCC and FCC unit cells packing efficiencies.	2M	4
1.b)	Sketch the E-k diagram and label the different bands.	2M	3
1.c)	Discuss the importance of Quantum Entanglement in quantum computing.	2M	3
1.d)	Write a short notes on Hyperthermia application of ferri magnetic materials.	2M	2
1.e)	Explain the principle behind the working of an optical fibre.	2M	2
PART-B (50Marks)			
Q.No	Questions	Marks	BTL
2. a)	Explain the method of obtaining Miller indices with an example.	5M	2
b)	Derive an expression of the interplanar distance for the plane of a tetragonal crystal structure.	5M	4
OR			
3 a)	Construct and label the block diagram of SEM and describe its working principle.	7M	3
b)	How does the surface area to volume ratio of a spherical nanoparticle change when its radius decreases?	3M	3
4. a)	Examine the Kronig-Penney model with a suitable diagram.	7M	4
b)	Explain Quantum confinement in nanomaterials.	3M	2
OR			
5. a)	Derive an expression for Schrödinger's time-independent wave equation and write the physical significance of wave function.	10M	4
6. a)	Explain the pauli's quantum gates form the basic building blocks of quantum computation. (Analyse their role in the construction and implementation of complex quantum circuits.)	6M	4
b)	Mention few challenges of Quantum computing over classical computing	4M	3
OR			
7. a)	Illustrate the representation of a qubit state on the Bloch Sphere with a suitable example.	5M	3
b)	Distinguish between Classical bits and Qubits	5M	4

8. a)	The Sol-Gel Process plays an important role in the synthesis of advanced ceramic and nanomaterials. Examine the various stages involved in the sol-gel process and assess its significance in material fabrication.	10M	4
OR			
9. a)	Explain the various types of polarization mechanisms in dielectrics and illustrate their dependence on frequency.	6M	2
b)	Explain the working principle and advantages of Ferroelectric RAM over conventional memory devices.	4M	2
10.a)	Construct the He-Ne laser and analyse its working principle with a neat diagram, including energy transfer between helium and neon.	7M	3
b)	Compare He-Ne and Semiconductor diode lasers on any two technical parameters	3M	4
OR			
11.a)	Derive the expression for acceptance angle and numerical aperture of an optical fibre using a suitable ray diagram.	7M	4
b)	Calculate the numerical aperture and acceptance angle of a given optical fibre if the refractive indices of core and cladding are 1.52 and 1.434 respectively.	3M	4

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