APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Scheme for Valuation/Answer Key
Scheme of evaluation (marks in brackets) and answers of problems/key
FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019
Course Code: PH100
Course Name: ENGINEERING PHYSICS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 2 marks.

Marks

1	Frequency decreases--- 1 mark, Time period increases -1 mark	(2)
2	Transverse waves -1 mark, Longitudinal waves -1 mark – Two points for each	(2)
3	Coherent sources- Constant phase relationship between waves – 1 mark	(2)
	Same frequency and same wavelength – 1 mark	
4	Grating element - 1 mark; grating equation in terms of grating element- 1 mark	(2)
5	Explanation with formula – 2 marks	(2)
6	Two examples for Type-I and Type-II superconductors- 1mark for each type	(2)
7	Proper description of Tunnel effect -2 marks	(2)
8	Symmetric wave function for Bosons-1 mark;	(2)
	Anti symmetric wave function for fermions – 1 mark	
9	Any two Differences between echo and reverberation -1 mark for each.	(2)
10	Magnetostriction effect -1.5 marks , Write one application -0.5 mark	(2)
11	Mention any 4 advantages of semiconductor laser -2 marks	(2)
12	Photovoltaic effect -2 marks	(2)

PART B
Answer any 10 questions, each carries 4 marks.

13	What is Resonance -1 mark ,expression for amplitude -1 mark , derivation of resonant frequency—2 marks	(4)
14	**1** mark for each value, (Ans:- A = 3×10^{-3} V/m, f = 1.33×10^{13} Hz, $\lambda = 2.24 \times 10^{-5}$ m, v = 2.9×10^{8} m/s) If **k** and **ω** are identified but **f** and **λ** are not calculated -1/2 mark for each	(4)
15	Construction and working - 3 marks, figure- 1 mark .	(4)
16	Distance between central maximum and first minimum x = f λ /a - 1mark; Correct substitution - 2 marks Answer with proper unit- 1 mark. (Answer: λ=5000 A°)	(4)
17	Equations for thickness of QWP & HWP -1 mark each , Proof- 2 marks	(4)
18	Proper explanation of Superconductivity-2 marks, Definition for transition temperature-1 mark, critical mag.field-1mark,	(4)
19	Formula-: $\lambda = h/\sqrt{(2mE)}$ - 1mark , Substitution – 2marks [E=$100 \times 1.6 \times 10^{-19}$ J]: Answer with unit (λ =1.22×10^{-10} m)– 1 mark	(4)

20   Explanation of Fermi level- 2 marks, Significance- 2 marks   (4)

21   Eqn.T=0.163V/A -1mark (A= ΣSx**α**), findingΣS=1720m^2---1 mark,   (4)

        substitution—1 mark, Ans. **α =0.0947** OWUm^{-2} or sabine m^{-2} —1mark

22   . Equation - 1 mark [f =1/(2π√LC)], Substitution & calculation - 2 marks   (4)

        Answer with unit - 1 mark [0.025 pF]

23   Two points for each - 4 marks   (4)

24   Block diagram -2 marks, Brief explanation of each part - 2 marks   (4)

PART C
Answer any three questions, each carries 6 marks.

25   Differential equation- 1mark; Derivation of general solution-2marks   (6)
        Time- displacement curve with conditions for 3 cases --3 marks.

26   Figure and explanation -2 marks, derivation of expression for **β** -2 marks,   (6)
        expression for **t** -1 mark , experiment to find thickness -1 mark

27   Describe production of elliptically polarized light(Production of plane polarised   (6)

        light,Use of QWP,Angle≠45°) -4marks, Detection(Nicol prism & QWP)- 2marks

28   Figure with explanation -1 mark,1-DSchrodinger equation for the particle-1 mark   (6)

        $k^2 = 2mE/\hbar^2$ -1/2 mark

        General solution $\psi = A \sin kx + B \cos kx$ −1 mark (or Ae^{ikx}+ Be^{-ikx})

        Applying boundary conditions and obtaining $\psi = A \sin kL$--1 mark

        Equation $kL = n\pi$ or k^2= $n^2\pi^2/L^2$---1/2 mark

        Equating the two values of k^2 and obtaining Equation $E_n = \frac{n^2\pi^2\hbar^2}{2mL^2}$ --1 mark

PART D
Answer any three questions, each carries 6 marks.

29   Definition for intensity of sound- 2 marks, expression- 1 mark.   (6)

        Definition for threshold of hearing intensity and its value-1.5marks

        Definition for threshold of pain intensity and its value-1.5marks

30   Inverse piezoelectric effect - 2 marks, Circuit diagram - 1mark   (6)

        working with two equations for frequency - 3 marks

31   Figure- 1 mark, construction(explanation of basic components) -2 marks,   (6)

        energy level diagram-1 mark, working(proper explanation of transitions)-2 marks

32   Explanation of principle(TIR with conditions) -2 marks,   (6)

        Step index fibre -1 mark, Graded index fibre - 1mark, Two advantages -2 marks.

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