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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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EPPHM202

Second Semester B.E. Degree Examination, May 2026
APPLIED PHYSICS FOR ME STREAM

TIME:3 hrs. Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
2. Formula Hand Books Permitted
3. M: Marks, L: Bloom's level, C: Course outcomes.

		Module-1	M	L	C
Q.1	a	Describe the construction and working of hand operated Reddy shock tube.Mention any three applications of shock waves.	8	L2	CO1
	b	Define spring constant. Obtain expression for equivalent force constant for two springs connected in series and parallel combination	8	L2	CO1
	c	A mass of 2kg suspended by a spring of force constant 51.26N/m is executing damped simple harmonic oscillations with a damping of 5kg/s.identify whether it is the case of underdamping or over damping.	4	L3	CO1
		OR			
Q.2	a	Obtain a differential equation for a body undergoing forced oscillation and mention expression for amplitude & Phase of oscillation. Discuss the three cases for variation of amplitude with frequency in forced oscillation.	10	L2	CO1
	b	What are shock waves? Mention three properties and applications of shock waves.	5	L2	CO1
	c	Evaluate the Mach number and speed of sound in helium gas at 350K. The object with speed of $2000ms^{-1}$.Given (γ for Helium = 1.667, R = 2008 $Jg^{-1}K^{-1}$)	5	L3	CO1
		Module–2			
Q.3	a	Derive relation between Young's Modulus, Rigidity Modulus & Poisson's Ratio	8	L2	CO1
	b	With neat diagram explain the stress-strain curve for elastic materials.	8	L2	CO1
	c	The Young's modulus for steel is $2\times10^{11}N/m^2$ and Rigidity modulus $8\times10^{10}N/m^2$. Calculate the Poisson's ratio.	4	L3	CO1
		OR			
Q.4	a	Explain the term bending moment. Show the bending moment of a thin uniform bar of rectangular cross section is $\frac{Ybd^3}{12R}$	10	L2	CO1
	b	Discuss the different types of beams and mention their engineering applications	5	L2	CO1
	c	Calculate the Poison's ratio for Silver, having Young's modulus as$7.25\times10^{10}N/m^2$ and bulk modulus 11×10^{10} N/m^2.	5	L3	CO1
		Module–3			
Q.5	a	State and explain Laws of thermoelectricity.	8	L2	CO2

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	b	Describe the construction and working thermoelectric generator (TEG).	7	L2	CO2
	c	The emf in micro volts(e) of a thermocouple, one junction of which is at 0°C is given bye=$1600T^{-4}T^2$ where T°C is the temperature of hot junction. Find (i) neutral temperature(ii) Peltier Coefficient.	5	L3	CO2
		OR			
Q.6	a	Explain applications of thermoelectricity on refrigerator.	8	L2	CO2
	b	Discuss Seebeck effect, and Peltier effect with their coefficients.	8	L2	CO2
	c	The thermo emf of a thermocouple is given by E = 2164t - $6.2t^2$. Calculate the neutral temperature and temperature of inversion.	4	L3	CO2
		Module–4			
Q.7	a	Describe the process of liquefaction of oxygen by cascade process	8	L2	CO3
	b	Explain the construction and working of Porous Plug experiment with neat diagram	8	L2	CO3
	c	In Joule Thomson experiment Temperature changes from 100°C to 150°C for pressure change of 20 MPa to 170 MPa. Calculate Joule Thomson Coefficient.	4	L3	CO3
		OR			
Q.8	a	Explain Joule Thomson Effect. Derive $\Delta T = \frac{(P_1 - P_2)}{C_p}\left[\frac{2a}{RT} - b\right]$	10	L2	CO3
	b	Explain the Liquefaction of Helium	5	L2	CO3
	c	Describe Joule-Thomson effect.	5	L2	CO3
		Module–5			
Q.9	a	Describe the construction and working of X-ray photoelectron spectroscopy.	8	L2	CO4
	b	Describe the construction & working of transmission electron microscope (TEM).	8	L2	CO4
	c	X-rays are diffracted in the first order from a crystal with d spacing 2.8 Å at a glancing angle 60°. Calculate the wavelength of X-rays.	4	L3	CO4
		OR			
Q.10	a	Describe the construction and working of Scanning Electron Microscope (SEM)	8	L2	CO4
	b	Define nano-material and nano composite and classify the nano-materials based on the dimensional constraints.	8	L2	CO4
	c	Find the effective spring constant in series combination of two springs given K_1=N/m & K_2=45N/m	4	L3	CO5

PROOF

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