Bachelor of Science (S.Y.B.Sc.) Third Semester (Old) B.Sc.23121 - Physics Paper-I (Thermodynamics and Acoustics)

P. Pages : 3 Time : Three Hours			Hours * 0 9 8 7 *	UG/W/18/1274 Max. Marks : 50						
	Not	es :	 All the questions are compulsory. Draw neat labelled diagram wherever necessary. 							
1.	Ei		her:							
	a)	i)	Explain reversible and irreversible process.	2						
		ii)	Describe Carnot's reversible cycle and obtain an expression for efficience engine working between two temperatures T_1 and T_2 .	cy of an heat 6						
		iii)	Find the efficiency of a Carnot's engine working between 127°C and 27° 80 cals of heat. How much heat is rejected?	C. It absorbs 2						
			OR							
	b)	i)	Define entropy. Discuss the physical meaning of entropy.	3						
		ii)	Show that entropy remains constant in reversible process but increases in process.	irreversible 4						
		iii)	Calculate the change in entropy when 10g of ice at 0°C is converted in 100°C. (Latent heat of ice = 80 cal/gram and Latent heat of steam = 540 $^{\circ}$	nto steam at 3 Cal/gram).						
2.	Either:									
	a)	i)	What is black body radiation.	1						
		ii)	Derive Planck's radiation law. Show that Planck's law reduces to Wien's law wavelengths and Rayleigh-Jeans law for longer wavelengths.	w for shorter 7						
		iii)	What is the wavelength at which human body radiates maximum energy?	Temperature 2						
			of human body is 37°C. Wien's constant is 2.898×10^{-3} mK.							
		OR								
	b)	i)	What is reverberation? Derive Sabine's reverberation formula.	8						
		ii)	A hall of volume 5500 m^3 is found to have a reverberation of 2.3 second absorbing surface of the hall has an area of 750 m^2 . Calculate the average coefficients.	s. The sound 2 ge absorption						

3. Either:

a)	Explain extensive and intensive variable with examples.	21/2						
b)	Prove the Clapeyron's latent heat equation $\frac{dP}{dT} = \frac{L}{T(V_2 - V_1)}$	2 ¹ /2						
	using Maxwell's thermodynamic relation.							
c)	A block body has its cavity in the shape of a cube. Determine the number of modes of vibration per unit volume in the wavelength region 4990A° to 5010A°.	21/2						
d)	Distinguish between noise and music.	21/2						
OR								
e)	State and explain zeroth law of thermodynamic. What is its importance?	2¹/ ₂						
f)	Explain thermodynamics scale of temperature.	2¹/ ₂						
g)	Explain the ultraviolet catastrophe according to Rayleigh-Jeans distribution law.	21/2						
h)	A broadcasting studio measuring $25 \times 12 \times 7$ metres has a reverberation time of 0.90 sec. when empty. What will be the reverberation time when an audience of 250 persons is present? (Given absorption coefficient of a person = 0.4 and average absorbing area of each person = 0.6 sq.m).	21/2						
	Either:							
a)	A Carnot engine has an efficiency of 30% when the temperature of sink is 27°C. What must be the change in temperature of the source to make its efficiency 50%	21/2						
b)	Explain the concept of Heat Death of Universe.	21/2						
c)	Explain the distribution of energy of a black body at different temperatures by drawing the graph.	21/2						
d)	What is a crystal microphone? Explain it's principle of operation.	21/2						
OR								
e)	What is internal energy of a system? "Internal energy is state function and not a path function." Explain.	21/2						

f) Calculate the specific heat of saturated steam given that specific heat of water at 100°C is $2^{1/2}$ 1.01 and latent heat of vaporization decreases with rise in temperature at the rate of 0.64 cal/K. Latent heat of vaporization of steam is 540 Cal.

4.

	g)	Exp i)	lain: Fery's Perfectly black body.	21/2
	h)	Explain briefly the principles involved in recording and reproduction of sound in a magn tape recorder.		21/2
5.		Attempt any ten of the followings.		
		a)	State First law of thermodynamics.	1
		b)	Define isochoric & isobaric process.	1
		c)	What is meant by cyclic process?	1
		d)	Write any two Maxwell's thermodynamic relations.	1
		e)	Draw T-S diagram.	1
		f)	State second law of thermodynamics in terms of entropy.	1
		g)	State any one Planck's quantum postulates.	1
		h)	Define emissive power of a perfectly black body.	1
		i)	Define absorptive power.	1
		j)	What is bel and decibel?	1
		k)	What is Transducers?	1
		l)	Define reverberation time.	1
