

(4)

JeeC [j] Jeeue Éej e DeeoMe&ime meckeaj Ce keá melleSeve keáer JÚeeKÜee
keáepeS~ >eáeilleká efeüel efeüel keá ceeve JeeC [j] Jeeue efeüel efeüel keá
heoellcellleehle keáepeS~ >eáeilleká leeh leeh keáe keáe cenlJe nP

3. (a) State and explain the Zeroth law of thermodynamics. How temperature is interpreted according to 0th law of thermodynamics? 4

Gceeiellekeáer keá MetÜeJelllefeüe keáes yeléeFS SjebmecePeFS~
Gceeiellekeáer keá MetÜeJelllefeüe keá Devergeej leeh keáer keále
DeJeej Cee nP

- (b) What is Boyle's temperature? Derive an expression for Boyle temperature. How is it related with temperature of inversion? 3½

yeeüue leeh keále nP yeeüue leeh keá melle keáe feieiceve
keáepeS~ ñen Gl>aceCe leeh mes ekeáme keáeaj mejeüele nP

Unit-II / FkeáF-II

4. (a) Give Lord Kelvin's and Clausius statement of II law of thermodynamics. Show that both are equivalent. 4

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(Printed Pages 8)

Roll No. _____

S-605

B.Sc. (Part-II) Examination, 2015

(Regular & Exempted)

PHYSICS

Second Paper

(Thermal Physics)

Time Allowed : Three Hours] [Maximum Marks : 50

Note : Answer Question No. 1, which is compulsory and one question from each Unit. Five questions are to be answered in all.

øllve meb 1, pesská Deefjeüeñw leLee feiÜeká FkeáF&mesSkeá
øllve keáe Göej oepes~ keáe heeße øllvelekeá Göej oes nP

1. Attempt all parts : $2 \times 10 = 20$

meYer Yeeie nue keáepeS :

(a) State principle of corresponding state?

meile DeJemLee keá emeæelle keáes yeléeFS~

(b) Differentiate between perfect gas and real gas

(2)

DeoMe& iome SJeb Jeemlelekaâ iome celNDellej mhe,, keâepeS~

- (c) An experimentator claims to have developed an engine working between 600 K and 300K capable of having an efficiency of 55%. What are your comments on the claim?

Skeâ ðeJeelekaâeves 600K leLee 300K keâi ce0Ùe keâeÙel
keaj vesJeeues Fheve keâesellekaânele keaj Gmekeâer #eclâe 55%
nerves keâe oeJee ekaâÙel Dehekeâer Fme oeJes hej keâeÙel ñtheCee
ñP

- (d) Calculate the change in entropy when 10gm of ice at O°C melts into water at O°C, (Latent heat of ice=80 cal/gm)

Sâtheer hefj Jelâe keâer ieCevee keâepeS peye 10gm yheâ
O°C hej O°C keâi heeveer celWefeleueler nW

- (e) Prove thermodynamically; $C_p - C_v = R$;
(where symbols have usual meaning)

Gceeiellekaâer Éej e meae keâepeS $C_p - C_v = R$; (penel
Meyoellkeâi Deheves efeenile DeLe&nbt)

(3)

(f) What is temperature of inversion? Explain.

JÙel>eâceCe leehâ keâeÙel nP mecePeeFS~

(g) How does entropy change in Joule-Thomson expansion? Explain.

petue-Lecemeve ellemlej celNSâtheer keâmeshef Jelâe neeP nP
JÙeeKÙee keâepeS~

(h) "Heat is a path function". Comment on the statement.

"Gceâ heLe heâuvee nW ~ Fme hej ñtheCee keâepeS~

(i) What is meant by degree of freedom?

mJelâe keâer keâesâ keâe keâeÙel Dehekeâe ñP

(j) Explain solar constant.

meesiej efeJelâe keâes mecePeeFS~

Unit-I / Fkaef-I

2. Discuss the modification of the equation of state for a perfect gas, as done by Van der Waal. Obtain expression for critical constants in terms of Van der Waal's Constant. What is importance of critical temperature? 7½

(8)	(5)
(b) State and prove law of equipartition of energy.	3½
Tpe& keā mecelej Ce keā efneæelle keāes yelēFS efnææ	
keāeefpeS-	
	uee[& keāejeve leLee keāeeefmeJeme keā Gceeiellekeāer keā otnej efneæe keā Leve keāes yelēFS- ebKeeFS eka oeelekeāLeve mecelgūe nq
	(b) Describe Carnot cycle and obtain expression for its efficiency. What is Carnot theorem?
	3½
	keāeveek Ueææ keāe ejlej Ce oepeS leLee Fmkeāer keā JUepekeā leehle keāeefpeS- keāeveek efneæelle keāe nq
5. (a) What is physical significance of entropy? Give its units? Why unavailable energy of universe tends to increase?	4
SCšeher keāe keāle Yenllkeā cen Je nq Fmkeāer oepeS- yefyel[keāer Delechle Gpe&keāelllyek ves keāes GÅe e jnleer nq	
(b) Prove	
$Cp - Cv = -TE\alpha^2 V$	
Where E is bulk modulus at constant temperature and α is coefficient of volume expansion.	3½
efneææ keāeefpeS -	
$Cp - Cv = -TE\alpha^2 V$	
penß E efneæe lehe hej Deleleve ßelUemLelee iefcekeā nq Dejj α Deleleve ßemeej iefcekeā nq	

(6)

Unit-III / Fleef-III

7½

6. What do you understand by the Joule Thomson effect? Obtain an expression for the Joule Thomson Coefficient on the basis of the laws of thermodynamics. What is importance of this effect from the point of view of liquefaction of gases?

petue-Lecemeve ðeYeeJe mes Deehe keb̄ee mecePeles nP T<ceeiellkeāer keā
efvJeceilkeā DeoOej hej petue-Lecemeve ieḡeeleā keā JÙelpēkaā ūeble
keāepēes iemeelkeā òJeekeaj Ce cellFmekēa keb̄ee cenlJe nP

7. (a) Discuss in detail the properties of He-I and He-II 4

He-I leLee He-II keā ieḡeeleā ūeble mes effeJeevee
keāepēes

- (b) Write explanatory note on liquefaction of gases. 3½

iemeelkeā òJeekeaj Ce hej JÙekÜeelcekeā eſtheCeer efueKeS-

Unit-IV / Fleef-IV

8. Obtain expression for mean free path of gas molecules. How does it depend on density,

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temperature and pressure?

The diameter of the molecule of a gas is 2×10^{-8} Cm and Boltzmann's constant is 1.38×10^{-23} J/K. Calculate the mean free path at N.T.P. 7½

ime DeCeDeelkeā Deemele mJelēhe keā efueS JÙelpēkaā ūeble
keāepēes~ Ùen IevelJe, Iehe Deej oye hej ekeāme ekeāej efueYe
keaj lēe nP

ekeāme ieme DeCegekeā JÙeme 2×10^{-8} Cm nwleLee yeſpeeeve
efvJeceilkeā 1.38×10^{-23} J/K nw Deemele mJelēhe keā
N.T.P. hej ieCevee keāepēes-

9. (a) Draw graph showing the distribution of energy with the wavelength in the energy emitted by a black body at different temperatures. What important results are obtained from these graphs? 4

Skeā keāfCekēa Éeje effeVelle Ieheelhej Glmeepēkaā Gpe&keā,
Gpe&lej heoÜe& efuej Ce «eheā KeDeS- Fve «eheāWÉeje
keb̄ee cenlJeheCe& meJeeveeSh eteueler nP