Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19

EXM/P/09/00

B. Sc-II	School of Science	Sem III
PHS201	Physics-III	Max Marks: 20
Day: Thursday Date: 30/5/2019	End Semester Examination Time: 30 minutes	2.30 to 3.00 pm.
Seat No.:	PRN No.:	Student Sign:
Invigilator Sign:	Examiner Sign:	Marks Obtained:

Instructions:

1) All Questions are compulsory.

2) Mark √ to the correct option. Do not circle.

3) More than one options marked will not be considered for assessment.

4) Rough calculations on paper are not allowed.

5) Use non-programmable calculator is allowed.

(A)

Q.1	A. Select the correct alternative	Marks	Bloom's level	CO
1.	In a cyclic process, work done (W) and heat (Q) are ---------- respectively	01	L2	201.1
a)	path function and point function	b)	point function and path function	
c)	point function and point function	d)	path function and path function	
2.	The adiabatic equation for ideal gas is----	01	L1	201.1
a)	$PT^{\gamma} = \text{constant}$	b)	$TP^{\gamma-1} = \text{constant}$	
c)	$P/V^{\gamma-1} = \text{constant}$	d)	$PV^{\gamma} = \text{constant}$	
3.	The change in internal energy can be represented as	01	L2	201.2
a)	$dU = TdS - PdV$	b)	$dU = TdV - PdT$	
c)	$dU = TdP - PdT$	d)	$dU = TdS - PdT$	
4.	The internal energy of an ideal gas is a function of	01	L1	201.2
a)	pressure	b)	temperature	
c)	volume	d)	entropy	
5.	The root mean square velocity of gas particles is -----	01	L1	201.3
a)	$U_{rms} = 9/4\ U_{mp}$	b)	$U_{rms} = 4/9\ U_{mp}$	
c)	$U_{rms} = 4\ U_{mp}$	d)	$U_{rms} = 9\ U_{mp}$	
6.	Mean free path for a gas molecule is---	01	L1	201.3

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a) $\lambda = \frac{2Vt}{\Pi d^2 n}$ b) $\lambda = \frac{Vt}{\Pi n}$

c) $\lambda = \frac{1}{\Pi d^2 n}$ d) $\lambda = \frac{Vt}{\Pi d^2 n}$

7. The Stefan's fourth power law is given by----- 01 L1 201.4

a) $E = \sigma T^4$ b) $E = \sigma/T^4$

c) $E = \sigma T^2$ d) None of the above

8. According to Quantum mechanics, the minimum size of a phase cell is---- 01 L1 201.4

a) h b) h^2

c) h^2 d) As small as possible

Q.1 B. Fill in the blanks

		Marks (6)	Bloom's level	CO
a)	The heat and work done relation in cyclic process is _____	1	L1	201.1
b)	The efficiency of the Carnot engine working between ice point and steam point is_____	1	L2	201.2
c)	The average path travelled by a gas molecule during its travel is called _____	1	L1	201.3
d)	The uniform velocity gradient along the increasing layer of gases is found to be_____	1	L1	201.3
e)	The Planck's law in terms of wavelength is given by_____	1	L1	201.4
f)	The particle that obey the Fermi-Dirac statistics is _____	1	L1	201.4

Q.1 C. State true or false

		Marks (6)	Bloom's level	CO
a)	The intermolecular energy of molecules at absolute zero is zero.	1	L1	201.1
b)	Entropy is a path function and work done is a point function. _____	1	L2	201.2
c)	The maximum of velocity distribution curve shifts towards high velocity with increasing the value of constant B, ($B = m/2K_BT$) _____	1	L2	201.3
d)	Maxwell distribution of velocity applies classical mechanics for obtaining velocity distribution_____	1	L1	201.3
e)	According to Bose-Einstein Statistics, there are only two particles allowed in a single state _____	1	L1	201.4
f)	The material medium is not required for conduction phenomenon _____	1	L2	201.4

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2018-19

EXM/P/09/00

B. Sc-II	School of Science	Sem III
PHS201	Physics-III	Max Marks: 80
Day: Thursday Date: 30/5/2019	End Semester Examination Time: 2 hr 30 minutes	3.00 to 5.30 pm

(B)

Instructions:
1) Questions Q.2, Q.3, Q.4 and Q.5 are compulsory.
2) Rough calculations on paper are not allowed.
3) Use non-programmable calculator is allowed.

		Marks (16)	Bloom's level	201.1
Q.2	**Answer the following questions**			
a)	Explain thermodynamic processes. Obtain work done during isothermal and adiabatic processes.	12	L2	
b)	What is specific heat? Derive specific heat for constant volume and constant pressure.	4	L3	
	OR			
b)	State zeroth law of thermodynamics. Air at NTP is compressed adiabatically to half of its volume. Calculate the change in its temperature. Given: γ for air is 1.4.	4	L3	

		Marks (16)	Bloom's level	201.2
Q.3	**Answer the following questions**			
a)	Using thermodynamic potentials derive thermodynamic relations and also obtain TdS equations.	12	L4	
b)	State and explain 2nd and 3rd law of thermodynamics	4	L3	
	OR			
b)	Find efficiency of a Carnot's engine working between 127 °C and 27 °C. It absorbs 80 Cals of heat. How much heat is rejected?	4	L3	

		Marks (24)	Bloom's level	201.3
Q.4	**Answer the following questions**			
a)	Write postulates of kinetic theory of gases. Derive relation for most probable velocity of a gas molecule.	12	L3	
b)	Define mean free path and sphere of influence. Obtain expression for the mean free path and write Maxwell's correction to it.	8	L5	
	OR			
b)	Obtain the expression for conductivity coefficient of gas molecules when heat is transferred to achieve equilibrium.	8	L5	

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	c) Derive the average velocity using velocity distribution function.	4	L3	
Q.5	**Answer the following questions**	**Marks (24)**	**Bloom's level**	**201.4**
	a) What is Bose-Einstein statistics? Obtain Bose-Einstein distribution law.	12	L4	
	b) Derive Wien's displacement law using Plank's radiation law.	8	L3	
	OR			
	b) Derive Stefan's Boltzmann law using Plank's radiation law.	8	L3	
	c) State the following:	4	L2	
	A. Black body. B. Planck's law			

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