## **RAMAKRISHNA MISSION VIDYAMANDIRA**

(Residential Autonomous College affiliated to University of Calcutta)

## SECOND YEAR [2018-21] B.A./B.Sc. THIRD SEMESTER (July – December) 2019 Mid-Semester Examination, September 2019

Dat Tim	е: е.	19/09/2019 11 am - 12 noon	PHYSICS (General) Paper : III	Full Marks · 25
		12 000	(Use a senarate Answer Rook for each group)	
(Ose a separate Answer Book for each group) Group – A				
	Ar	nswer <u>any two</u> que	estions of the following:	[2×5]
1.	a)	State the assumption	ptions of kinetic theory of gases.	[3]
	b)	Show that the pressure exerted by a perfect gas is two-third of the kinetic energy of molecules in a unit volume.		gy of the gas [2]
2.		State the law of equipartition of energy. Show how you can use the law to calculate the heats of gases and hence find the value of $\gamma$ for diatomic and triatomic gases. ( $\gamma$		the the specific $(\gamma \equiv ratio of)$
		specific heats.)	: heats.)	
3.	a)	Discuss briefly the considerations which led Van der Waals to modify the gas equation. What are the critical constants of a gas? Calculate the value of these in terms of the constants van der Waal's equation.		ation. [2]
	0)			[1+2]
4.		Show that for a usual meaning.	diabatic changes in a perfect gas $P.V^{Y} = constant$ , the notations	having their [5]
$\frac{\text{Group} - \textbf{B}}{\text{Answer any three questions of the following:}} $				
		<u></u> 4		[6.10]
5. a) b)		Write an expression of force on a point charge q by continuous charge distribution through volume V. Prove that $\vec{E} = -grad\phi$ , where $\vec{E}$ is the electric filed and $\phi$ is electric potential.		ion through a [3]
				[2]
6.	a)	Find potential er	nergy of a dipole in an uniform electric field.	[3]
	b)	In a region of sp What is the value	pace near the point $(-3m; 2m, 5m)$ the potential is $\phi = 40x^2 + 30y^2$ is of electric field intensity?	$^{2}-10z^{2}$ Volt. [2]
7.		What do you mean by dielectric polarisation? Find the relation between $\vec{D}, \vec{P}$ and $\vec{E}$		$ec{E}$ .
		Where $D$ is the $\vec{D}$ is the	displacement vector of electric charge.	
		$P$ is the $\vec{E}$ is the	polarisation vector.	Г1 - <i>А</i> Э
				[1+4]
8.	a) b)	How a current lo	cop behaves like a magnetic dipole?	[3]

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- 9. Find a relation between self and mutual inductance?

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[5]