Name: Enrolment No:	

UPES

End Semester Examination, May 2025

Programme Name: B. Sc Geology **Semester :** II
Course Name : Igneous Petrology **Time :** 03 hrs
Course Code : PEGS1010 **Max. Marks:** 100
Nos. of page(s) : 04

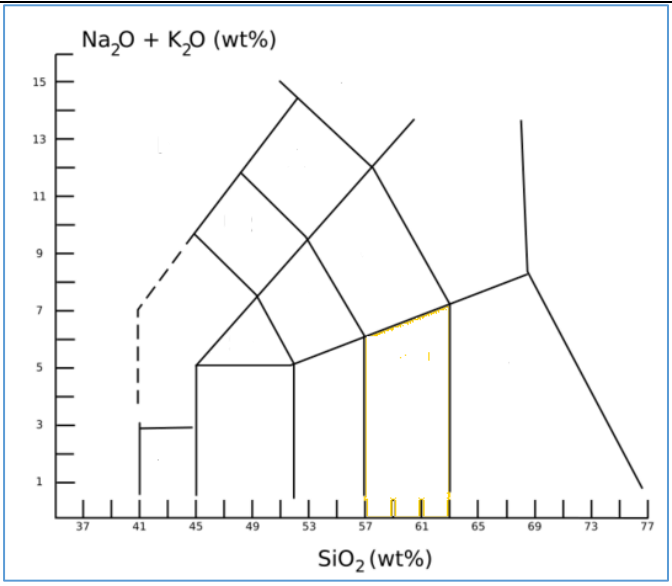
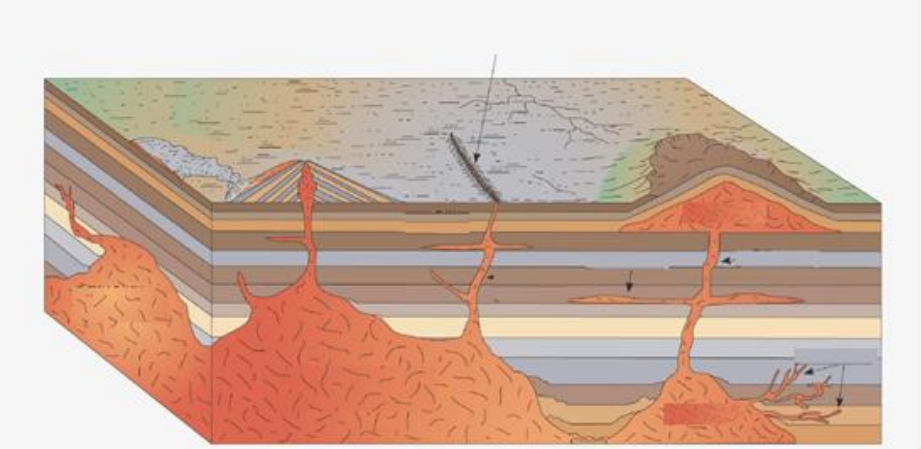
Attach the Binary Phase diagram with Answer-script
Attach the CIPW sheet with Answer script
Draw the diagram for Q 8 in Answer script

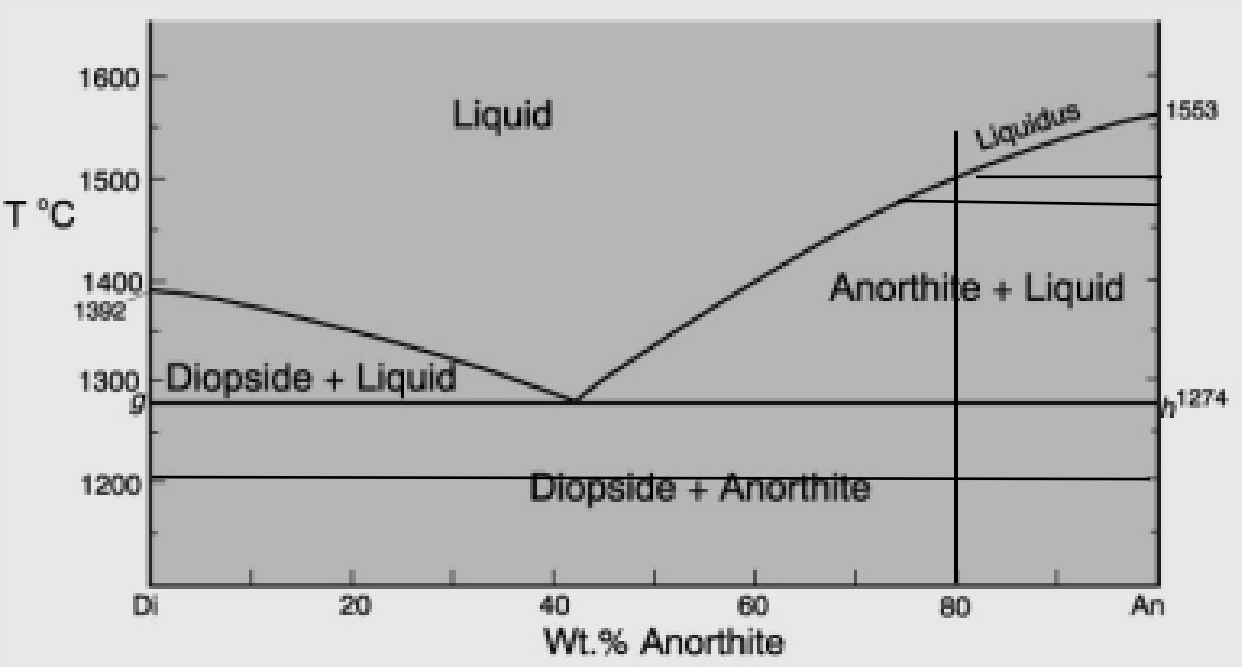
SECTION A (20 Marks)

S. No.		Marks	CO
Q 1	Classify igneous rocks using tabular classification scheme	05	CO1
Q 2	Explain the megascopic textures of Igneous rock	05	CO1
Q 3	Analyze the role of incompatible elements in partial melting	05	CO2
Q 4	Differentiate between Cone-sheet and ring-dyke	05	CO2

SECTION B (40 Marks)

Q 5	Define the following a) Orbicular structure b) Explain transgressive sill c) Congruent melting d) Inequigranular Texture e) Mid-oceanic basalt	02*5 =10	CO1
Q 6	Explain Ophitic and poikilitic texture, highlighting the relation between the two.	10	CO2
Q7	a) Summarize degree of crystallinity and classify igneous texture based on the same b) ii. Classify ophitic texture in Igneous rocks	5+5 =10	CO2
Q 8	Using the TAS classification a) Classify the Volcanic igneous rocks b) Explain Phonolite c) Differentiate between Basalt and Picro-basalt	10	CO3

	 **OR** Identify and label (marked ones and unmarked ones) the various igneous forms and describe their characteristic features. 		
SECTION C (40 Marks)			
Q 9	Classify Basalt and analyze the role of garnet in formation of various types of basalt/ basaltic magma.	**20**	**CO3**
Q 10	Using a binary isobaric diagram, calculate the percentage of solid and liquid, along with their respective composition at different temperature conditions. The temperature conditions are 1490^{o}C (T1), 1400^{o}C (T2), 1274^{o}C and composition of magma: An80Di20. **OR** Using CIPW Norm, calculate the Salic and Femic minerals, their abundance, and the rock class.	**20**	**CO3**


1600
1500
1400
1300
1200
T °C
Liquid
Liquidus
1553
Anorthite + Liquid
1392
Diopside + Liquid
g
h
1274
Diopside + Anorthite
Di
20
40
60
80
An
Wt.% Anorthite

Constituents Of Rock		SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O	CO_2	TiO_2	P_2O_5	SO_2	S	MnO	Molecular Proportions	Molecular Weights	Percentage NORM	Group of standard mineral	
Percentages(analysis)		49.68	36.13	2.49	8.88	1.13	0.79	0.25	0.32												
Molecular Weights		60	102	160	72	40	56	62	94	18	44	80	32	355	19	71					
Molecular Proportion																					
Quartz	SiO_2																	60		Q	
Orthoclase	$K_2O, Al_2O_3, 6SiO_2$																	556			
Albite	$Na_2O, Al_2O_3, 6\ SiO_2$																	524			
Anorthite	$CaO, Al_2O_3, 2\ SiO_2$																	278		F	
Leucite	$K2O, Al_2O_3, 4\ SiO_2$																	436			
Nepheline	$Na2O, Al_2O_3, 2\ SiO_2$																	284		L	Salic
Corundum	Al_2O_3																	102		C	Group
Acmite	$Na_2O, Fe_2O3, 4SiO_2$																	462			
	CaO, SiO_2																	116			
	MgO, SiO_2																	100			
Diopside	FeO, SiO_2																	132			
Wollastonite	CaO, SiO_2																	116			
	MgO, SiO_2																	100			
Hypersthene	FeO, SiO_2																	132		P	
	$2MgO, SiO_2$																	140			
Olivine	$2FeO, SiO_2$																	204		O	
Magnetite	FeO, Fe_2O_3																	232			
Haematite	Fe_2O_3																	160			
Ilmanite	FeO, TiO2																	152		M	
Pyrite	FeS_2																	120			
Apatite	$3Cao, P_2O_3, 1/3CaF_2$																	336			Femic
Calcite	$CaO.CO_2$																	100		A	Group