

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December- 2022

Course Name: Igneous Petrology

Semester: III

Programme Name: B. Sc Geology (Hons)

Time: 03 hrs

Course Code: PEGS 2024

Max. Marks: 100

Instruction: Attach the QAPF Diagram & CIPW Sheet with Answer Script

SECTION A

(5Qx 4M = 20 Marks)

Q 1	a. The two main mechanisms through which rocks melt are ---- and ----- b. With respect to silica percentage, two extreme types of magmas are ----- & -----	04	CO1
Q 2	Mark True/ False a. Rhyolitic magmas are the most viscous one b. Rocks consisting of more than 90% mafic minerals are termed as Melanocratic c. Gabbro is devoid of quartz d. Plagioclase replaced by nepheline in nepheline-syenite	04	CO1
Q 3	a. Sills linked by relatively short dike-like segments known as ----- b. Volcanic glass is otherwise known as ----- c. Anhedral grains give rise to -----texture d. Transformation of glass to crystalline matter is known as -----	04	CO1
Q 4	a. In Poikilitic texture, smaller grains/ -----are accommodated in larger grains/ ----- b. CIPW Classification based upon two types of minerals, namely ----- & -----	04	CO2
Q 5	a. Mutually touching phenocrysts in interstitial matrix give rise to ----- texture b. Sandpaper is an example of ----- abrasive. c. In CIPW, the input mineral composition must be in ----- form d. Plutons of area < 100 sq. km is known as -----	04	CO2

SECTION B

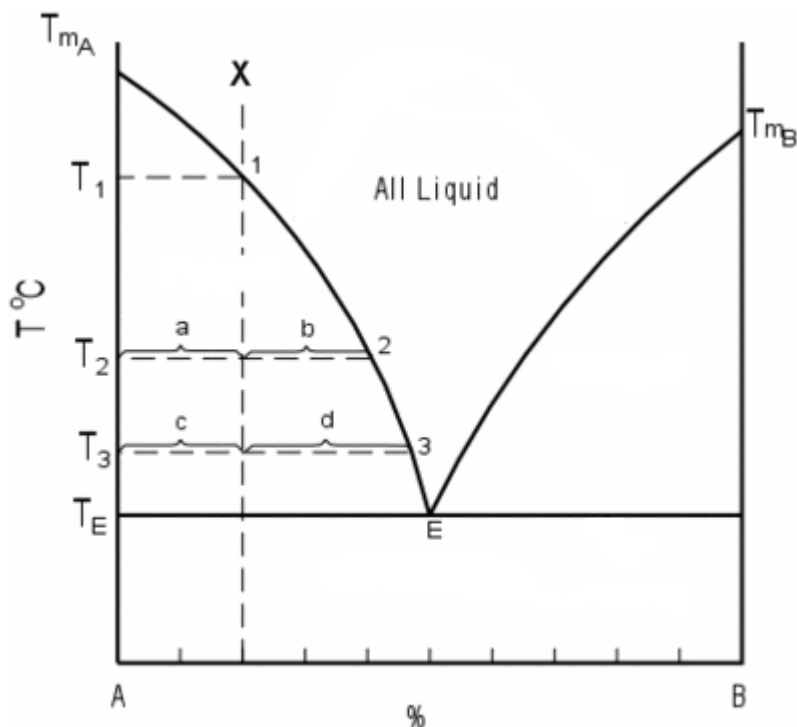
(4Qx10M = 40 Marks)

Q 6	Differentiate between vesicular and amygdaloidal texture and defend their occurrence in volcanic rocks	10	CO3
Q 7	Explain the formation mechanism of porphyritic texture highlighting the role of physio-chemical condition	10	CO2
Q 8	Defend the statement “Reaction texture termed as Reaction structure”.	10	CO3
Q 9	Compare Tamman & Ostwald theories and suggest the most appropriate one governing crystallization of uni-component magma. OR Examine & validate the statement “Uni-component system should have a maximum of two degree of freedoms”.	10	CO4

SECTION C

(2Qx20M = 40 Marks)

Q 10



Label the Binary phase diagram where A & B are the two components of a binary system. With suitable assumptions, examine congruency/ incongruency of it.

5+15
10=20 CO3

Q 11

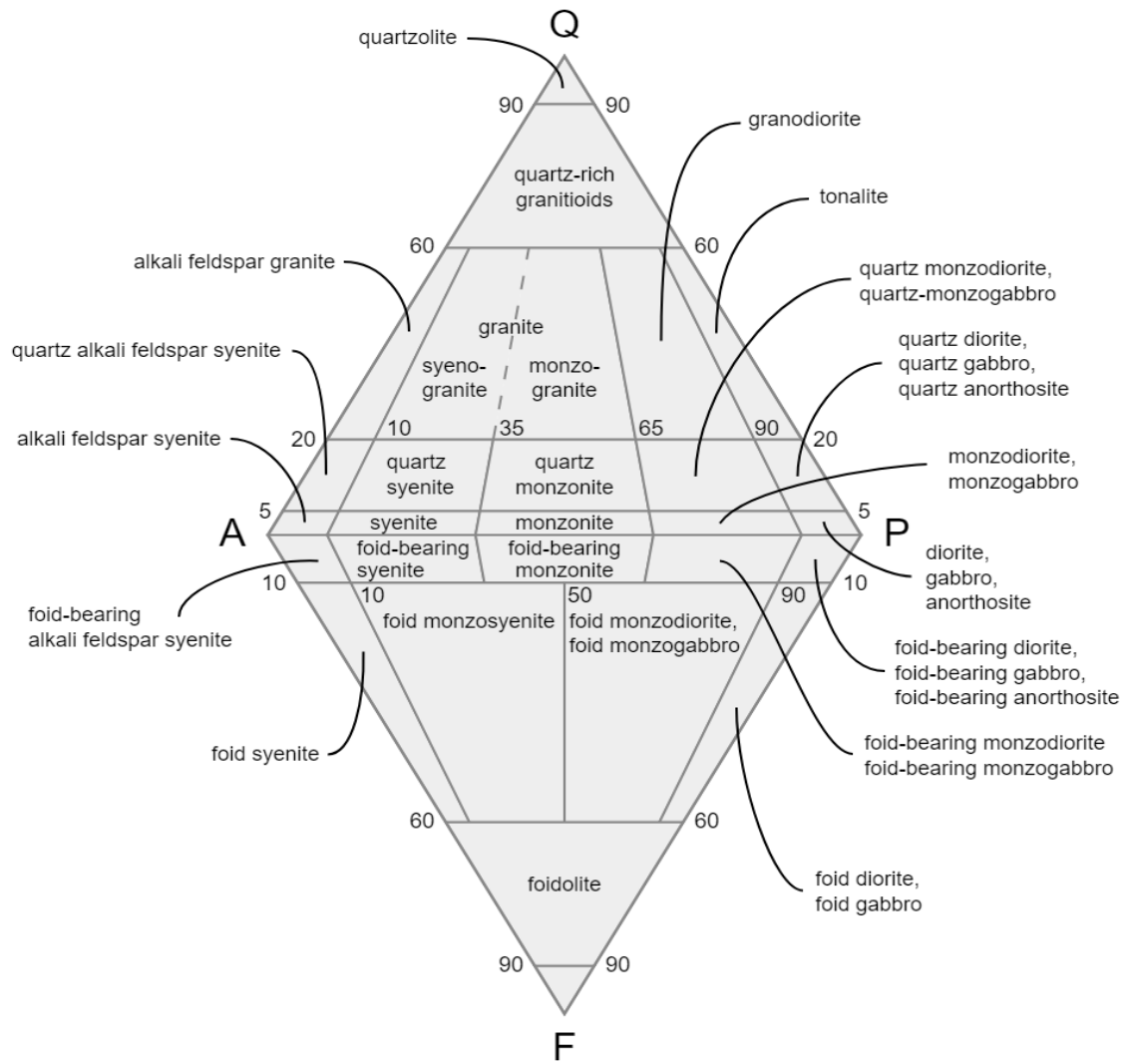
Using QAPF Diagram, give suitable nomenclature to the below- mentioned composition
 Rock is a silica under-saturated one. The composition is as follows
 Quartz: 25%
 Anorthite: 20%
 Orthoclase: 20%

OR

Using CIPW Norm, find out the Salic and Femic minerals, their abundance and the rock class.

The spread-sheet is attached below.

20 CO4



Constituents Of Rock		SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	H ₂ O	CO ₂	TiO ₂	P ₂ O 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	Salic Group
Orthoclase	K ₂ O, Al ₂ O ₃ , 6SiO ₂																	556			
Albite	Na ₂ O, Al ₂ O ₃ , 6 SiO ₂																	524			
Anorthite	CaO, Al ₂ O ₃ , 2 SiO ₂																	278		F	
Leucite	K ₂ O, Al ₂ O ₃ , 4 SiO ₂																	436			
Nepheline	Na ₂ O, Al ₂ O ₃ , 2 SiO ₂																	284		L	
Corundum	Al ₂ O ₃																	102		C	
<u>Acmite</u>	Na ₂ O, Fe ₂ O ₃ , 4SiO ₂																	462			Femic Group
<u>Diopside</u>	CaO, SiO ₂																	116			
	MgO, SiO ₂																	100			
	FeO, SiO ₂																	132			
<u>Wollastonite</u>	CaO, SiO ₂																	116			
<u>Hypersthene</u>	MgO, SiO ₂																	100			
	FeO, SiO ₂																	132		P	
<u>Olivine</u>	2MgO, SiO ₂																	140			
	2FeO, SiO ₂																	204		O	
<u>Magnetite</u>	FeO, Fe ₂ O ₃																	232			
<u>Haematite</u>	Fe ₂ O ₃																	160			
<u>Ilmanite</u>	FeO, TiO ₂																	152		M	
<u>Pyrite</u>	FeS ₂																	120			
<u>Apatite</u>	3CaO, P ₂ O ₅ , 1/3CaF ₂																	336			
<u>Calcite</u>	CaO.CO ₂																	100		A	