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UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

END Semester Examination, MAY 2018

Program: B-TECH GSE | **Semester – V I**

Subject (Course): ANALYTICAL METHODS IN GEOSCIENCE | **Max. Marks : 100**

Course Code : GSEG-315 | **Duration : 3 Hrs**

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SECTION –A [5 x 4=20 MARKS]

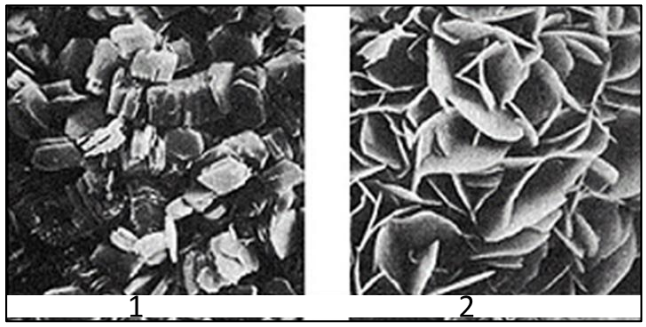
1. Write note on application of atomic absorption spectroscopy. **[5marks]**
2. If a 125 × 4.6 mm column and a flow rate of 1 mL min^{-1}. Calculate the estimated dead time. **[5 marks]**
3. Define a crystal. What are different crystallographic systems? Explain the symmetry of crystal and various criteria of symmetry**. [1+2+2=5 marks]**
4. Write the difference between scanning electron microscopy and transmission electron microscopy. **[5 marks]**

SECTION –B [10x 4=40 MARKS]

5. **(a)** Describe the basic differences between atomic emission and atomic absorption? **[5marks]**

   (b) In which technique, atomic absorption or atomic emission is the flame temperature stability more critical? Why? **[5marks]**

6. Identify the clay minerals present in the following SEM images. Discuss the role of clays in petroleum reservoirs. **[5+5= 10 marks]**



7. Trace element composition of kerogen from Niger Delta are given below. Give your comments on type of kerogen and depositional environment of the source rock. [**10marks]**

sample	V	Cr	Co	Ni	Mn	Fe	Cu
1	277	33.3	24	114	243	5212	56
2	134	21	19	61	179	4489	51
3	97	17.55	12	49	157	3309	44

8. (a) Explain the acquisition, processing and interpretation processes of computed tomography. **[5 marks]**

(b) Clarify the uses of X ray computed tomography and micro computed tomography in petroleum exploration? **[5marks]**

[OR]

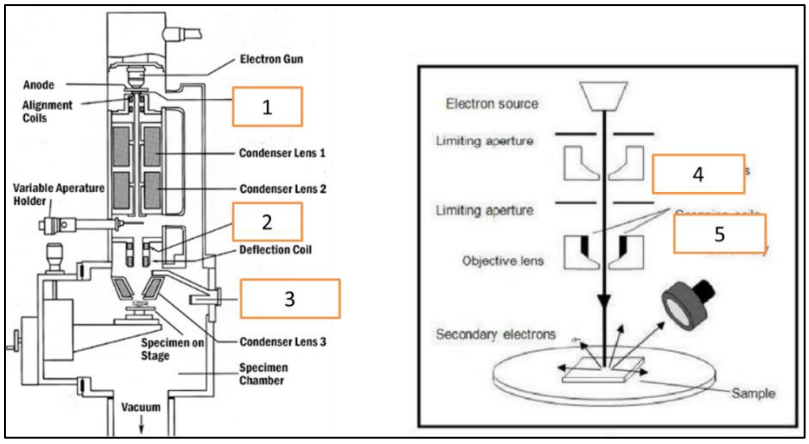
(a) Assess the surface characterization techniques. **[5 marks]**

(b) Elaborate the uses and principle of micro beam analysis. **[5 marks]**

SECTION –C [20x2=40 MARKS]

9. (a) Identify the parts of microscopy instruments denoted by 1, 2, 3, 4, 5 and explain their uses. **[5+10=15 marks]**

(b) Investigate the reasons to use tungsten in electron gun. **[5 marks]**



10. **[5+7+8=20marks]**

(a) Discuss the basic principle of X- ray diffraction technique?

(b) What do you mean by miller indices and why it is important in XRD study?

(c) Image plateX-ray detectors usually stand perpendicular to the primary beam that passes through the middle of the circular (340 mm diameter) active area of the detector. Calculate the maximum resolution that can be reached with a distance of 45 mm between crystal and detector i. with CuKαradiation, λ= 1.5418 Å and

ii. with MoKα, λ= 0.7107 Å

[OR]

(a)Assess the application and limitations of XRD technique? **[5 marks]**

(b) When an x ray powder pattern of crystalline copper is obtained using x ray from copper target, the wavelength of K line is 4.05pm, reflections are found to be at: 21.65; 25.21; 37.06.

Calculate: (i) type of cubic crystal; (ii) length of side of unit cell; (iii) radius of copper atom**.** **[5x3=15marks**]

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