



'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 5th Semester Examination, 2021

DSE-P1-GEOLOGY

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

**The question paper contains PART-A and PART-B.
The candidates are required to answer any *one* from *two* parts.
Candidates should mention it clearly on the Answer Book.**

PART-A

FUEL GEOLOGY

1. Answer any *five* questions: 1×5 = 5
 - (a) Define API gravity.
 - (b) ***“Cool liquefaction refers to the process of turning coal into Syncrude”*** — State whether statement is correct or not.
 - (c) Which would have higher permeabilities: reservoir rocks or source rocks?
 - (d) How will you differentiate between vitrinites and inertinites when studied under reflected microscope?
 - (e) “Crude oil is called ‘Sweet’ if it has $\leq 1\%$ sulfur” – State whether statement is true or not.
 - (f) What is / are the difference/s between coal ball and ball coal?
 - (g) Is UCG environmentally safe?
 - (h) Define Rank of coal.

2. Answer any *three* questions: 5×3= 15
 - (a) What are the distinct attributes of ***‘Coal Liquefaction’***?
 - (b) ***“In some cases, oil may be accumulated without closure”***. Justify the statement with reason and example.
 - (c) What is CBM? What is cleat? Briefly address the environmental concerns about CBM.
 - (d) Explain the concepts of Isovols and Isocals.
 - (e) Among Gasification processes – UCG and SCG, which one will you prefer and why?

3. Answer any *two* questions: 10×2= 20
- (a) With suitable illustrations, discuss different mechanisms of stratigraphic trap formation. How salt tectonics help in formation of hydrocarbon trap? 7+3 = 10
- (c) “*Volatile matter is a desired component of coal*” – discuss the statement. Explain the process of primary migration of hydrocarbon. 5+5 = 10
- (c) What is the importance of hydraulic fracturing in the production of CBM? Write about the Pros and Cons of hydraulic fracturing. 5+5 = 10
- (d) What are the factors that strongly affect the formation of Gas Hydrate? Among the Underground Coal Gasification (UCG) and Surface Coal Gasification (SCG), which one is the more preferred Coal Gasification technique and why? 5+5 = 10

PART-B

RIVER SCIENCE

1. Answer any *five* of the following: 1×5 = 5
- (a) Define drainage basin.
- (b) What is the source of energy in the hydrological cycle?
- (c) What is sinuosity parameter?
- (d) What is evapo-transpiration?
- (e) What term refers to the maximum size of particle that a stream can carry?
- (f) What do you understand by river reach?
- (g) Name the largest drainage basin of Indian subcontinent.
- (h) What is hydrograph?
2. Answer any *three* from the following: 5×3 = 15
- (a) What are the possible forms of river based upon channel substrate? Illustrate with neat sketches.
- (b) What are the main external factors controlling a river basin?
- (c) What do you understand by rain-splash erosion and sheet wash erosion?
- (d) What are the modes of sediment transportation in river systems? Illustrate.
- (e) What are regimes of free surface flow in terms of Reynold’s and Froude number?
3. Answer any *two* from the following: 10×2 = 20
- (a) What do you understand by drainage network? Illustrate different types of drainage network pattern with suitable diagram. 3+7 = 10
- (b) Discuss the importance of spatial and temporal scales in river systems with suitable diagrams.
- (c) How stream-discharge can be measured?
- (d) How river flow is characterized based upon velocity and acceleration? State Bernoulli’s equation. Define Froude number.

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