TEVETA
Technical Education Vocational and Entrepreneurship Training Authority

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY

LEVEL 6 YEAR III EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: NOVEMBER/ DECEMBER 2025

SUBJECT: PETROLEUM AND GEOLOGY

TIME: THREE (3) HOURS **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your Examination Number and National Registration Card (NRC) Number on the answer booklet provided.
2. Write the ANSWER SCRIPT SERIAL NUMBER on the examination register and on the entry slip.
3. This paper has seven (7) Questions. Question one (1) is compulsory. Answer four (4) Questions from the remaining six (6) Questions.
4. Diagrams may be used where necessary to clarify your answer.
5. Cellphones and programmable calculators are not allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

QUESTION ONE (COMPULSORY)

a) Define the following terms with respect to Petroleum industry:

i. Paraffinic hydrocarbons. **[2 marks]**

ii. Olefinic. **[2 marks]**

iii. Dienes. **[2 marks]**

iv. Aromatics. **[2 marks]**

b) Aromatic oil extraction, or essential oil extraction, involves Steam distillation, cold pressing, Superficial Fluid Extraction and solvent Extraction to isolate aromatic compounds from plant materials. Explain these processes used in the essential Oil Extraction. **[12 marks]**

[Total: 20 marks]

QUESTION TWO

a) Define "API gravity".

b) State the environmental impact of hydride sulfurization (HDS). **[4 marks]**

c) Explain the:

i. significance of crude oil classification. **[4 marks]**

ii. role of a fractionating column in crude oil refining. **[4 marks]**

d) Calculate the volume (in barrels) of diesel produced from 1,000 barrels of crude oil, assuming a 25% yield. **[4 marks]**

e) Compare the efficiency of thermal cracking versus catalytic cracking in producing gasoline. **[4 marks]**

[Total: 20 marks]

QUESTION THREE

a) Define the following:

i. Enthalpy of combustion. **[2 marks]**

ii. Saponification value . **[2 marks]**

b) Describe the extraction of the following:

i. Sulfur **[3 marks]**

ii. Hydrogen **[3 marks]**

iii. Carbon black **[3 marks]**

c) 40 grams of methane (Mr =16.04g/mol) was found to raise temperature of 5 kg of water by 100. Calculate the molar enthalpy of combustion of methane. Take specific heat capacity of water to be 4.2J/g.C. **[7 marks]**

[Total: 20 marks]

QUESTION FOUR

Methane is used in the production of Methanol which is later used in Gasoline production.

a) Describe the commercial production of Methanol from methane, include essential chemical equations. **[10 marks]**

b) Explain the production of Gasoline from Methanol, include essential chemical equations. **[10 marks]**

[Total: 20 marks]

QUESTION FIVE

a) Define "permeability" in petroleum geology. **[3 marks]**

b) State the impact of rock properties in enhancing oil recovery (EOR) techniques. **[4 marks]**

c) Explain **two (2)** ways rock density influences seismic wave propagation. **[4 marks]**

d) Calculate the effective porosity of a rock sample with a total porosity of 25% and an isolated porosity of 5%. **[5 marks]**

e) Compare the porosity of sandstone and shale. **[4 marks]**

[Total: 20 marks]

QUESTION SIX

a) Flame test is a simple technique used to identify minerals based on the colour prodeced when heated in a flame. Complete the table below by indicating the color associated with each mineral

MINERAL	**COLOUR**
Copper	
Iron	
Calcium	
Sodium	

[4 marks]

b) State three **(3)** properties shared by all electromagnetic waves. **[3marks]**

c) Explain the:

i. Procedure for analyzing gold ores using the fire assay technique. **[6 marks]**
ii. intensity of electromagnetic waves change with frequency. **[4 marks]**
iii. ways the amplitude of waves affect energy of waves. **[3 marks]**

[Total: 20 marks]

QUESTION SEVEN

a) Define "seismic stratigraphy" in petroleum exploration. **[4 marks]**

b) Explain the roles of the:

   i. geochemistry in identifying sources of rocks. **[4 marks]**

   ii. geology in developing unconventional resources like shale gas. **[4 marks]**

c) Calculate the depth (in meters) of a reflector if the two-way travel time of a seismic wave is 0.5 seconds and the wave velocity is 3,000 m/s. **[4 marks]**

d) Compare the use of 2D and 3D seismic surveys in identifying oil reservoirs. **[4 marks]**

[Total: 20 marks]