P1123

[3732] - 101

M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 1 : Fundamentals of Petroleum Geology
(New Course) (Sem. - I)

Time : 3 Hours]　　　　　　　　　　　　　　　　　*[Max. Marks : 80*

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *You are advised to attempt not more than 5 questions.*

Q1) What are reservoir traps? How are they classified? Explain with neat diagrams various structural traps or traps associated with salt domes. **[20]**

Q2) What are the unconventional resources of Hydrocarbons? Explain Gas Hydrates in detail. **[15]**

Q3) How conversion of Organic Matter into Petroleum takes place? **[15]**

Q4) Write notes on (any 3) : **[15]**

　　a) Classification of oil field brines.

　　b) Inorganic theory of origin of oil.

　　c) Primary migration of oil.

　　d) Electrical method of direct detection of oil.

Q5) What are the modes of occurrences of petroleum deposits? Describe the surface occurrences of petroleum. **[15]**

Q6) What are reservoir fluids? Give their distribution in reservoir.   **[15]**

Q7) Explain the following (any three) :   **[15]**

    a)   Types of kerogen.

    b)   Carbonate reservoir rocks.

    c)   Geographic distribution of oil and gas.

    d)   Classification of 'oil field waters'.

❖ ❖ ❖ ❖

P1124

[3732] - 102
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 2 : Principles of Sedimentology
(New Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1)   Question No. 1 is compulsory. Out of the remaining attempt 4 questions.

2)   Neat diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

4)   You are advised to attempt not more than 5 questions.

Q1) Define sedimentary environment. Give the concept and tabular classification of environment. Describe marine environment.   **[20]**

OR

What are climbing ripple lamination? State and describe different types of climbing ripple laminations, giving their hydrodynamic interpretation.

Q2) Define Walther's Law. Describe sub surface environmental interpretation with suitable examples.   **[15]**

Q3) What are flow regime? Give the concept of flow regime. Outline the characteristics of lower flow regime. Describe the bedform associated with it.   **[15]**

Q4) Write notes on (any 3) :   **[15]**
   a)   Rhythmites.
   b)   Mud and Sand volcano.
   c)   Classification and origin of siliceous rocks.
   d)   Composition and rock grading of conglomerate.
   e)   Application of sedimentology in petroleum exploration.

Q5) Define diagenesis. Describe diagenetic changes in the sediments add a note on Compaction and Solution. **[15]**

Q6) Describe the importance of sequence in environmental reconstruction. **[15]**

Q7) Write notes on (any 3) : **[15]**

    a)   Diagnosis of sedimentary facies.

    b)   Reservoir Heterogeneity.

    c)   Chemical processes of sedimentation.

    d)   Longshore bar cross bedding.

    e)   Classification and origin of carbonaceous rocks.

❖ ❖ ❖ ❖

P1125

[3732] - 103
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 3 : Interpretative Micropalaeontology & Stratigraphy
(New Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *You are advised to attempt not more than 5 questions.*

Q1) Write in detail the significance of micropaleontology in Geological applications. **[20]**

<div align="center">OR</div>

Explain the term Paleoecology. Enumerate your answer giving criteria to establish the Paleoecology of foraminifera add a note on its significance.

Q2) Explain the term Stratigraphy. Enumerate your answer with special reference to the stratigraphic classifications using rock units, time-rock units and magnetic elements an criteria. **[15]**

Q3) Discuss the Eocene Stratigraphy and Micropaleontology of the Sedimentary sequence of K.G. Basin. Add a note on the Paleoenvironmental setting of the basin due Eocene. **[15]**

Q4) Write on the role of Organic Maturation in Hydrocarbon exploration. **[15]**

Q5) Attempt any two : [15]

    a) Correlation.

    b) Platform type basins.

    c) Characterisation of Tertiary Hydrocarbons.

Q6) Attempt any two : [15]

    a) Species Diversity.

    b) Ecology of Ostracods.

    c) Types of Microfossils.

Q7) Attempt any two : [15]

    a) Sequence stratigraphy.

    b) Stratigraphic procedures.

    c) Geological time scale.

❖ ❖ ❖ ❖

P1126

[3732] - 104
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 4 : Structural Techniques in Petroleum Exploration
(New Course) (Sem. - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

    4)   *You are advised to attempt not more than 5 questions.*

Q1) Describe with neat diagrams, the stratigraphic control of the sealing of fault traps. **[20]**

<div align="center">OR</div>

State the characteristics of folds important to petroleum geologist and explain with neat figures, cross folding and multiple axes in relation to closure.

Q2) Describe recognition of subsurface unconformities and explain relation of unconformities to traps for oil and gas production. Comment on effect of unconformities on oil and gas prospects. **[15]**

Q3) What are Reconnaissance and detail maps? How much errors are permissible in their construction. **[15]**

Q4) Write notes on (any 3) : **[15]**
    a)   Mental factors in wild catting.
    b)   Flowage or stretching during folding.
    c)   Piedment scraps.
    d)   Truncation.
    e)   Fractures as reservoir rocks

Q5) Out line origin of saltdomes, with reference to model studies.   **[15]**

Q6) What are buried hills? Explain with neat figures, traps within, around and over buried hills.   **[15]**

Q7) Write notes on (any 3) :   **[15]**

    a) Reversal due to faulting.

    b) Strike overlap.

    c) Closures produced by intersecting faults.

    d) Geologic and areal maps.

    e) Structural conditions favouring production from fractures.

❖ ❖ ❖ ❖

P1127

[3732] - 201

M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 5 : Fundamentals of Petroleum Geochemistry
(New Course) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1)   *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

2)   *Neat diagrams must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

4)   *You are advised to attempt not more than 5 questions.*

Q1) Enumerate different components of petroleum and describe non-hydrocarbon components of petroleum.   **[20]**

OR

Explain in detail the alkanes and cycloalkanes with examples.

Q2) What are kerogens? Explain the formation and types of kerogen.   **[15]**

Q3) How are Crude Oils classified? Describe physical classification of Crude Oil.   **[15]**

Q4) Write notes on (any three) :   **[15]**

a)   Palmer's classification of oil field waters.

b)   Tissot and Welte's classification of oil.

c)   Importance of oil field water analysis.

d)   Aromatic hydrocarbons.

Q5) Describe in detail the following physical properties of oil. Density and Viscosity. **[15]**

Q6) Describe with the help of pressure-temperature composition diagram the behaviour of pure hydrocarbon. **[15]**

Q7) Explain the following (any two) : **[15]**

    a)   Gases in petroleum.

    b)   First generation petrochemicals.

    c)   Miscellaneous petrochemicals.

❖ ❖ ❖ ❖

P1128

[3732] - 202

M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 6 : Depositional System Analysis and Petroliferous Basins of India
(New Course) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *You are advised to attempt not more than 5 questions.*

Q1) State the various fluvial models and explain with neat diagram, the depositional model of coarse grained meander belt system giving its diagnostic characteristics.   **[20]**

OR

Define delta. Give classification of delta system and describe high constructive delta.

Q2) What is a sedimentary model? How is the concept of sedimentary model derived? State the various sedimentary models.   **[15]**

Q3) What are coastal basins? Describe tectonic setting, geological setting and petroleum prospects of Bombay offshore basin.   **[15]**

Q4) Write notes on (any three) :   **[15]**
   a) Strandplain system.
   b) Crevasse splays.
   c) Cratonic basin.
   d) Facies tracts.

P.T.O.

Q5) What do you mean by seismic stratigraphic interpretation. State different seismic reflection parameters used in seismic stratigraphy and describe briefly their geological significance. **[15]**

Q6) What are divergent margin basins? Explain rift basin and pull apart basin as divergent margin basin with respect to general characteristic, sediment sequence and petroleum characteristics giving suitable examples. **[15]**

Q7) Explain the following (any two) : **[15]**

    a)   Slope stratigraphic units.

    b)   Structural setting & petroleum prospects of Cauvery basin.

    c)   Evidences of relict shelves.

❖ ❖ ❖ ❖

P1129

[3732] - 203
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 7 : Petroleum Exploration
(New Course) (Sem. - II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

   1)   Question No. 1 is compulsory. Out of the remaining attempt 4 questions.
   2)   Neat diagrams must be drawn wherever necessary.
   3)   Figures to the right indicate full marks.
   4)   You are advised to attempt not more than 5 questions.

Q1) Describe the use of gravity, magnetics seismic reflection and seismic refraction in hydrocarbon exploration.   **[20]**

                                    OR

Describe how gravity method is useful in petroleum exploration, support your answer with some examples.

Q2) a)   Write a note on Rubidium or Cesium vapour magnetometer.   **[15]**
      b)   Explain the importance of free air and bouguer corrections in gravity prospecting.

Q3) a)   Write a note on processes responsible for microseepages of hydrocarbon.
      b)   Write four stages of geochemical prospecting for hydrocarbon.   **[15]**

Q4) Write notes on any three :   **[15]**
      a)   Fermat's principle.
      b)   What are the different seismic elastic waves.
      c)   Use of satellite imagery for oil prospecting.
      d)   Secular and diurnal correction in magnetic method.
      e)   Base station importance in gravity survey.

Q5) What physical parameter of the earth is measured in : **[15]**

    a)   Gravity.

    b)   Magnetic.

    c)   Seismic refraction draw diagrams to illustrate your answer.

Q6) What are the different remote sensing techniques in petroleum exploration give their uses and limitations. **[15]**

Q7) Write notes any three : **[15]**

    a)   Proton Precession magnetometer.

    b)   Eh-pH as an exploration tool.

    c)   Difference between surface and body waves.

    d)   Poisson's ratio and its importance.

    e)   Tidal correction in gravity method.

❖ ❖ ❖ ❖

P1130

[3732] - 204
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 8 : Environmental Management & Economics
(New Course)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1)   Question No. 1 is compulsory. Out of the remaining attempt 4 questions.

2)   Neat diagrams must be drawn wherever necessary.

3)   Figures to the right indicate full marks.

4)   You are advised to attempt not more than 5 questions.

Q1) Explain the 'concept of costs'? Describe its importance in the industry, with regard to total average, marginal, fixed and variable costs.   **[20]**

OR

What is the need for flaring in the oil industry? Explain the concept of smokeless flame and describe various factors associated with it.

Q2) Explain the air pollution caused and its effects with reference to the case study of upper Assam oil field.   **[15]**

Q3) Explain the concept of soil pollution in an oil industry. Explain, giving suitable examples, the ill effects of soil pollution, due to oil industry, on human health & control measures.   **[15]**

Q4) Write notes on (any three) :   **[15]**

   a)   Sources of oil spill and its prevention.

   b)   Control of noise pollution in oil industry.

   c)   Types of air pollutants in oil industry.

   d)   Air pollution during drilling operations.

   e)   Groundwater pollution during oil production.

Q5) What are acceleration projects in oil industry? Explain any one of them in detail, giving suitable example. **[15]**

Q6) Define and explain the present day value (PDV) concept and its effects on project analysis in oil industry. **[15]**

Q7) Write notes on (any three) : **[15]**
   a) Law of variable proportion.
   b) Break even analysis.
   c) Long term capital expenditures.
   d) Environment & project risk in oil industry.
   e) Decision node and chance node.

❖ ❖ ❖ ❖

P1131

[3732] - 301
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 9 : Reservoir Dynamics
(New) (Sem. - III)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

    1)   *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

    4)   *You are advised to attempt not more than 5 questions.*

Q1) What is meant by capillary pressure and wettability in the reservoir fluids? Describe their effects on oil and gas displacement in the reservoirs. **[20]**

<div align="center">OR</div>

Explain the characteristics of water drive and gas cap drive. Explain, in detail, the mechanism of working of the water drive during flow of fluids and gases in a reservoir.

Q2) Explain and differentiate between saturated and undersaturated reservoirs; and also volumetric and non-volumetric reservoirs. **[15]**

Q3) Write notes on (any three) : **[15]**

    a)   Specific gravity of gases and their effects on reservoir conditions.

    b)   Compressibility of reservoir fluids.

    c)   Application of diffusivity equation.

    d)   Geothermal gradient and temperature measurement in the reservoir.

    e)   Formation of emulsions in reservoirs.

Q4) Describe in detail, the pressure conditions around a well bore and explain the effects of permeability on the reservoir pressure.   **[15]**

Q5) Explain, in detail, how gas-in-place is calculated by volumetric method for a gas reservoir.   **[15]**

Q6) What is the importance of PVT studies? Describe how PVT data is evaluated to understand the reservoir condition.   **[15]**

Q7) Write notes on (any three) :   **[15]**
   a)   Unit recovery and recovery factor.
   b)   Oil reservoir under Dissolved gas drive.
   c)   CHDT.
   d)   Radial flow of compressible fluid and its use in reservoir studies
   e)   Effect of casing and channel leak on reservoir pressure conditions.

❖ ❖ ❖ ❖

P1132

[3732] - 302
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 10 : Formation Evaluation - I
(New Syllabus) (Sem. - III)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *You are advised to attempt not more than 5 questions.*

Q1) Describe in details the conventional resistivity logging method with reference to principle, devices used, log presentation and application. **[20]**

OR

Describe in brief the different components of wire line logging equipments with neat diagram.

Q2) Explain temperature logging with reference to objectives, principle, properties measured and applications. **[15]**

Q3) Explain how focussed electrode logs are useful over conventional resistivity logs. Describe the principle, equipment, depth of investigation, vertical resolution and application of Laterolog 7. **[15]**

Q4) Write notes on <u>any three</u> of the following : **[15]**
   a) What are the constituents of MWD and its importance.
   b) Application of caliper logging.
   c) Parameters of importance in "logging environment".
   d) Shale potential.
   e) Delaware effect.

Q5) Explain the working principle of spectral Gamma Ray log, its qualitative and quantitative use. **[15]**

Q6) Explain induction logging with reference to objectives, properties measured, principle, equipment, optimum logging, conditions. **[15]**

Q7) Answer <u>any two</u> of the following : **[15]**

    a)   Explain the factors affecting shape and amplitude of SP curves.

    b)   Microspherically focussed logs.

    c)   Sequence of events in simple DST and its application.

❖ ❖ ❖ ❖

P1133

[3732] - 303

M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 11 : Drilling and Well Completions
(New Course)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *You are advised to attempt not more than 5 questions.*

Q1) Enumerate the types of oil well drilling rigs and describe the CIRCULATORY or ROTARY system in detail with neat diagrams. **[20]**

Q2) a) Give the functions of drilling muds and add a note an oil-base muds.**[8]**

    b) Describe PDC bits. **[7]**

Q3) a) Explain with neat diagrams how formation characteristics play role in hole deviation. **[8]**

    b) Write note on types of directional wells and requirements of their survey. **[7]**

Q4) Write notes on (any three) : **[15]**

    a) Well planning objective.

    b) Drill collars and their uses.

    c) Dog leg in directional wells.

    d) Plastic viscosity and yield point of drilling mud.

    e) Jack-up rig.

Q5) a) Name different fishing tools and describe the tools used for fishing pipes. **[8]**

b) Explain differential pipe-sticking. **[7]**

Q6) a) Describe the open-hole completion method with its advantages & disadvantages. **[8]**

b) What are packers? Name the different packers & give the advantages of retrievable packers. **[7]**

Q7) Write notes on (any three) : **[15]**

a) Surface indications of a well-kick.

b) Perforations.

c) Squeeze cementing & it's uses.

d) Lost circulation materials.

e) Functions of casing.

❖ ❖ ❖ ❖

P1135

[3732] - 401
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 13 : Reservoir Performance

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) Question No. 1 is compulsory. Out of the remaining attempt 4 questions.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) You are advised to attempt not more than 5 questions.

Q1) What are RLT tests? Describe the procedure of any one productivity test, in detail. **[20]**

OR

Enumerate various activities involved in reservoir engineering. Describe, in detail, the role played by reservoir engineers in the performance tests of the reservoir.

Q2) Define and describe the 'Pressure Transient Analysis' with the help of diffusivity equation. **[15]**

Q3) What are different reservoir tests conducted during reservoir studies? Explain, in detail, the procedure and interpretation of drill stem tests of the reservoir.

[15]

Q4) Write notes on (any three) : **[15]**

a) Importance of pressure build-up test.

b) Permeability curves.

c) Flowing-well performance.

d) Criteria for rational development of an oil well.

e) Indicator diagram in an Pressure Transient analysis.

Q5) What is meant by a tertiary recovery of a crude oil? Describe miscible techniques in detail. **[15]**

Q6) What is meant by the term 'reservoir simulation'? Describe any one modelling concept of reservoir simulation in detail. **[15]**

Q7) Write notes on (any three) : **[15]**
    a)   Pressure maintenance.
    b)   Selection of data during reservoir simulation.
    c)   Forecasting future performance of a reservoir.
    d)   Future of enhanced oil recovery.
    e)   Thermal techniques of oil recovery.

❖ ❖ ❖ ❖

P1136

[3732] - 402
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 14 : Formation Evaluation - II
(New Syllabus) (Sem. - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *You are advised to attempt not more than 5 questions.*

Q1) Describe the DENSITY OR NEUTRON LOG with reference to principles, Tools, log representation, units of measurement, calibration, environmental effects and applications. **[20]**

Q2) a) Explain the physical principle of Litho-Density Tool.

b) Discuss the environmental effects on the modern Induced Gamma Ray spectra spectrometry. **[15]**

Q3) Explain why & how modern BHC sonic tool was developed adding a note on derivation of Wyllie's formula for porosity. **[15]**

Q4) Write notes on (any three) : **[15]**

a) Porosity and gas indications from TDT log.

b) Elastic parameters from sonic logs.

c) Cement Bonds Log (CBL).

d) Schlumberger Litho-Density Tool.

e) Attenuation of Sonic wave in cased hole.

Q5) Explain the measurement technique of EPT log and add a note on its applications. **[15]**

Q6) Describe the principles of Nuclear Magnetic Log and add a note on its method of measurements. **[15]**

Q7) Write notes on (any three) : **[15]**
  a)   Gas detection from overlays.
  b)   Quantitative interpretation of acoustic images.
  c)   Borehole Televiewer Tool.
  d)   Depth of Investigation and vertical resolution of EPT log.
  e)   Uses of different cross-plots.

❖ ❖ ❖ ❖

P1137

[3732] - 403
M.Sc. (Applied)
PETROLEUM TECHNOLOGY
PT - 15 : Production Operations
(New Course) (Sem. - IV)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

 1) *Question No. 1 is compulsory. Out of the remaining attempt 4 questions.*

 2) *Neat diagrams must be drawn wherever necessary.*

 3) *Figures to the right indicate full marks.*

 4) *You are advised to attempt not more than 5 questions.*

Q1) What is formation damage? Explain in detail plugging caused by fluid filtrates and by particle migration. **[20]**

OR

What is acidizing? Describe sandstone acidizing in detail.

Q2) What are fracture fluids? Give their uses and use of different fracture fluids in different formations. **[15]**

Q3) Describe in detail causes of scale deposition and explain how scales are removed chemically and mechanically. **[15]**

Q4) Write notes on (any three) : **[15]**

 a) Coiled Tubing system.

 b) Transient pressure test.

 c) Factors affecting gun perforating results.

 d) Low-Fluid-Loss cement squeezing.

Q5) Explain in detail sand control mechanism. **[15]**

Q6) What is corrosion? Explain sweet and sour corrosion in detail. **[15]**

Q7) Explain the following (any two) : **[15]**

    a)   Prevention of well damage with the help of surfactants.

    b)   Geologic factor affecting reservoir properties in carbonate reservoir.

    c)   Cement additives.

❖ ❖ ❖ ❖