



UNIVERSITI
TEKNOLOGI
PETRONAS

FINAL EXAMINATION MAY 2024 SEMESTER

COURSE : PEB1012/PFB1012 - INTRODUCTION TO OIL & GAS
INDUSTRY AND SUSTAINABLE DEVELOPMENT
DATE : 30 JULY 2024 (TUESDAY)
TIME : 9:00 AM - 11:00 AM (2 HOURS)

INSTRUCTIONS TO CANDIDATES

1. Answer **ALL** questions in the **OMR** sheet.
2. Indicate clearly answers that are cancelled, if any.
3. Do not leave the examination hall during the exam without permission.
4. **DO NOT** open this Question Booklet until instructed.
5. **DO NOT** take the question paper out of the examination hall.

Note :

- i. There are **FOURTEEN (14)** pages in this Question Booklet including the cover page .
- ii. **DOUBLE-SIDED** Question Booklet.

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1. Which of the following is an example of unconventional reservoir?
 - A. Sandstone reservoir
 - B. Carbonate reservoir
 - C. Tight shale reservoir
 - D. Porous clastic reservoir

2. The following rocks are sedimentary rocks **EXCEPT**
 - A. Shale
 - B. Limestone
 - C. Mudstone
 - D. Marble

3. Which of the following is **NOT** an example of exploration method?
 - A. Electrical survey
 - B. Quantity survey
 - C. Seismic survey
 - D. Magnetic survey

4. Choose the **WRONG** statement.
 - A. The seismic refraction method involves measuring the shortest time required for an induced seismic pulse to travel from the source location to a series of receivers.
 - B. From the travel time data, seismic velocities can be calculated but not the layer depths.
 - C. Seismic refraction remains the preferred method for accurately mapping the depth to competent bedrock under most conditions.
 - D. Seismic reflection is ideal for mapping geology at depths exceeding 50 m.

5. Select the **WRONG** statement regarding magnetic surveying.
- A. The magnetic method is the study of the distribution of magnetic minerals in the upper 200-300 km of the earth's crust.
 - B. The magnetic method may also be used to estimate the thickness of the crust or to constrain temperatures in the crust using the Curie isotherm, whichever is shallower.
 - C. Magnetic measurements in geophysical exploration record variations in the magnetic field due to lateral variability in the magnetization of the crust.
 - D. The lateral variation may produce anomalous regions which are indicative of structural or lithological contrasts in the subsurface.
6. The Multi-channel Analysis of Surface Waves (MASW) is a seismic method used to evaluate the _____ wave velocities of subsurface materials through the analysis of the dispersion properties of Rayleigh surface waves.
- A. longitudinal
 - B. shear
 - C. compressional
 - D. sound
7. Select the **FALSE** statement regarding source rock.
- A. Under the right conditions, source rocks may also be reservoir rocks, as in the case of shale gas reservoirs.
 - B. Rocks of marine origin tend to be oil prone.
 - C. Rocks of marine origin tend to be gas prone.
 - D. Typical source rocks are shale and limestone.
8. Which element is **NOT** part of the Rock Cycle.
- A. Weathering and erosion
 - B. Collision
 - C. Compaction and cementation
 - D. Melting

9. Which device is used in magnetic surveying?
- A. Magnetometer
 - B. Accelerometer
 - C. Gravimeter
 - D. Barometer
10. Select the **BEST** statement to describe the reason why appraisal wells are drilled.
- A. To confirm hydrocarbons discoveries from exploration stage are economical enough to be developed.
 - B. To determine the existence of hydrocarbons.
 - C. To confirm the type of fluids and fluid contacts for enhanced oil recovery.
 - D. To comply with the country's oil and gas exploitation regulations.
11. What is the significance of porosity in reservoir rocks?
- A. Determines fluid storage and flow capacity
 - B. Measures the density of the rock
 - C. Indicates the temperature of the reservoir
 - D. Reflects the chemical composition of the rock
12. Which unit is used to measure permeability in reservoir rocks?
- A. Pascal (Pa)
 - B. Darcy (D)
 - C. Newton (N)
 - D. Joule (J)
13. What does the term 'saturation' refer to in reservoir rock properties?
- A. The density of the rock
 - B. The fraction of pore spaces filled by fluid
 - C. The weight of the rock
 - D. The temperature of the fluid

14. What is overburden pressure?
- A. Pressure exerted by the rock and sediment layers above a point
 - B. Pressure of the fluid within the reservoir
 - C. Atmospheric pressure at the surface
 - D. Pressure of the drilling fluid
15. What is the function of wettability in reservoir rocks?
- A. Determines the viscosity of the fluid
 - B. Influences the distribution of oil, water, and gas
 - C. Measures the temperature of the reservoir
 - D. Indicates the chemical composition of the rock
16. Which property quantifies how different phases flow through reservoir rocks under various conditions?
- A. Porosity
 - B. Permeability
 - C. Relative Permeability
 - D. Saturation
17. Which unit is commonly used to express surface tension in reservoir rocks?
- A. Pascal (Pa)
 - B. Dyne/centimeter (Dyn/cm)
 - C. Joule (J)
 - D. Newton (N)
18. Which property describes the mass per unit volume of hydrocarbon fluid?
- A. Viscosity
 - B. Density
 - C. Saturation
 - D. Permeability

19. What does API gravity measure?
- A. The temperature of the crude oil
 - B. The relative density of crude oil
 - C. The chemical composition of the crude oil
 - D. The viscosity of the crude oil
20. What does the coefficient of isothermal compressibility indicate?
- A. Change in volume in response to temperature
 - B. Change in volume in response to pressure
 - C. Change in density in response to temperature
 - D. Change in density in response to pressure
21. Which of the following is **NOT** a primary objective of well completion in oil and gas drilling?
- A. Ensuring wellbore stability
 - B. Maximizing production efficiency
 - C. Minimizing environmental impact
 - D. Enhancing drilling fluid properties
22. What is the purpose of drilling fluid (mud) in oil and gas drilling?
- A. Cooling down the drill bit
 - B. Lubricating the drill string
 - C. Providing well control
 - D. ALL of the above
23. What is the main function of a blowout preventer (BOP) system on a drilling rig?
- A. Regulating the flow of drilling fluid
 - B. Isolating the wellbore in case of a blowout
 - C. Maintaining drilling fluid viscosity
 - D. Providing power for drilling operations

24. Which component of a drilling rig is responsible for rotating the drill string?
- A. Derrick
 - B. Drawworks
 - C. Drill pipe
 - D. Top drive
25. Which type of drill bit is most commonly used for drilling through hard formations in oil and gas drilling?
- A. PDC (Polycrystalline Diamond Compact) bit
 - B. Roller cone bit
 - C. Diamond bit
 - D. Tricone bit
26. What is the purpose of using drilling mud additives?
- A. Increasing the weight of the drilling mud
 - B. Enhancing drilling fluid lubrication
 - C. Improving wellbore stability
 - D. ALL of the above
27. Which drilling fluid property is crucial for hole cleaning and lifting the drill cuttings?
- A. Viscosity
 - B. Density
 - C. Filtration control
 - D. Rheology
28. What is the primary function of stabilizers in a drill string?
- A. Providing support and centralization
 - B. Maintaining drill string tension
 - C. Enhancing drill bit durability
 - D. Controlling wellbore pressure

29. Which of the following is **NOT** a common type of casing used in oil and gas drilling?
- A. Production casing
 - B. Surface casing
 - C. Conductor casing
 - D. Packer casing
30. Which casing design feature helps prevent fluid migration between formations in a wellbore?
- A. Casing centralizers
 - B. Casing hangers
 - C. Casing shoes
 - D. Casing collars
31. When the production of two or more wells is commingled in a central facility, it is necessary to install _____ to allow the production of the wells into the common production line or the well test line.
- A. Manifold
 - B. Wellhead
 - C. X-tree
 - D. Separator
32. Which statement is **INCORRECT** about Wellhead.
- A. Wellhead includes at least one choke used to control well production.
 - B. It has shut-down valve to quickly interrupt production in case of an event.
 - C. The gathering system begins at the wellhead.
 - D. If upstream pressure is low, it is recommended to use a positive choke in series with an adjustable choke.

33. Design of equipment depends on _____.
- A. physical properties and phase behavior
 - B. phase behavior and hydrocarbon fluid chemical properties
 - C. phase Behavior, flow of hydrocarbon fluids and physical properties
 - D. only fluid chemical and physical properties
34. Equipment design can be affected by physical properties, which are _____.
- A. vapor pressure and density
 - B. molecular weight, viscosity and surface tension
 - C. composition and gas/liquid volumes
 - D. ALL of the above
35. Reynold's number (Re) is used to:
- A. identify flow regime.
 - B. indicates fluids resistance to flow.
 - C. obtain fluid viscosity behaviour.
 - D. find transport properties of oil and gas.
36. Which statement is **CORRECT** about the advantage of vertical separator.
- A. Liquid level and fluids control NOT critical.
 - B. Easier and costly to design for surge capacity.
 - C. Can handle solids with certain design.
 - D. Easy to clean.
37. The water, separated from the oil and gas in the platform separation trains, is known as _____.
- A. waste product
 - B. produced water
 - C. injected water
 - D. water knockout

38. Which factor is **NOT** governing selection of storage mode?
- A. Economic considerations
 - B. Pollution control
 - C. Safety considerations
 - D. Quality degradation
39. Which storage tank type is **NON-conventional** storage?
- A. Fixed roof tank
 - B. Shuttle tanker
 - C. Floating roof tank
 - D. Floating production offloading storage (FPOS) facility
40. Which statement is **WRONG** about pigging applications?
- A. To clean and increase line efficiency.
 - B. To locate obstructions and inspections of the line.
 - C. To separate products.
 - D. To remove air and gas.
41. Which of the following is **NOT** the main value chain in oil and gas industry?
- A. Midstream
 - B. Retail
 - C. Downstream
 - D. Flowstream
42. Which of the following is part of crude oil composition?
- A. Asphaltics
 - B. Aromatics
 - C. Paraffins
 - D. ALL of the above

43. What of the following is **NOT** part of non-hydrocarbons in crude oil composition?
- A. Nitrogen
 - B. Helium
 - C. Oxygen
 - D. Sulphur
44. In terms of sulphur content, sweet crude oil means _____.
- A. the sulphur content is high
 - B. the crude oil contains more carbon dioxide
 - C. the crude-oil contains sugar
 - D. the sulphur content is low
45. Downstream process is defined as process that involves breaking down crude oil into various valuable components. Which of the following **CANNOT** be defined as a downstream process?
- A. Mixing
 - B. Separation
 - C. Treating
 - D. Reforming
46. Which of the following process lowers the viscosity of heavy crude oil molecules by turning it into smaller molecules?
- A. Cracking
 - B. Separation
 - C. Treating
 - D. Reforming
47. What is the primary function of thermal conversion and catalytic conversion?
- A. To upgrade lower-value materials
 - B. To improve the characteristics of a fuel
 - C. To reduce harmful impurities in petroleum fractions and residues
 - D. ALL of the above

48. Which of the following is **NOT** referring to petrochemicals?
- A. Chemical products derived from petroleum
 - B. Olefin
 - C. Benzene
 - D. Nitrogen
49. Which of the following process can be done under atmospheric condition or under vacuum condition?
- A. Mixing
 - B. Separation
 - C. Treating
 - D. Reforming
50. Which of the following is **NOT** the factors affecting the choice of feedstock in petrochemical plant?
- A. Availability
 - B. Cost
 - C. Temperature
 - D. Product to be produced
51. Sustainable development requires that energy resource .
- A. cannot be exhausted completely
 - B. can be complete exhausted
 - C. can destroy the environment
 - D. cannot meet the growing demand
52. Sustainability can be achieved by replacing existing resources with other resources of equal value.
- A. The statement above is correct
 - B. The statement above is incorrect

53. Which of the following ensures sustainable growth?
- A. Positive economic growth, deterioration of environment with economic expansion and energy resource meeting energy demands.
 - B. Negative economic growth, deterioration of environment with economic expansion and energy resource meeting energy demands.
 - C. Positive economic growth, non-deterioration of environment with economic expansion and growth of energy resource not meeting energy demands.
 - D. Positive economic growth, deterioration of environment with economic expansion and growth of energy resource meeting energy demands.
54. What are the **THREE (3)** pillars of sustainable development?
- A. Energy, economy and environment
 - B. Reduce, reuse and recycle
 - C. Energy, economy and envision
 - D. Ergonomics, evolution and economy
55. What is the goal of sustainability in any processes?
- A. To maintain the process finitely
 - B. To eventually eliminate the process
 - C. To maintain the process indefinitely
 - D. To support damaging the environment
56. Which of the following **BEST** describes the aim of sustainable consumption and production?
- A. To reduce resource consumption, waste generation and emissions across the full life cycle of processes and products
 - B. To increase resource consumption, waste generation and emissions across the full life cycle of processes and products
 - C. To reduce resource consumption, increase waste generation and emissions across the full life cycle of processes and products
 - D. To increase resource consumption, reduce waste generation and emissions across the full life cycle of processes and products

57. Which of the following energy resources seems inexhaustible?
- A. Natural gas
 - B. Coal
 - C. Solar
 - D. Crude
58. Which of the following **BEST** describes Wave Energy?
- A. It is the process by which energy is transferred by waves on the ocean's surface and then captured to perform useful tasks.
 - B. It depends on waves and can be implemented at any location.
 - C. It does not affect marine ecosystem.
 - D. No waste or harmful products but it is expensive to operate.
59. Which of the following statements is **CORRECT** about Solar Energy?
- A. It is a clean, renewable energy source that is created by microwave radiation.
 - B. It is employed by solar collection methods such as solar cells.
 - C. It is converted into useable energy such as electricity that can be applied to solar pumping systems or separation treatment.
 - D. Solar thermal energy has mirrored surface that absorb sunlight to heat up liquid to steam to generate electricity.
60. Which of the following statements about the Geothermal Energy is **ACCURATE**?
- A. Power produced using steam produced by heat emanating from the molten core of the earth.
 - B. A popular way of generating electricity around the world.
 - C. The material most often used in geothermal power station is the element uranium.
 - D. It is extremely expensive to build and must be built to a very high standard.

- END OF PAPER -