| Uka Tarsadia University(Diwaliba Polytechnic) |
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| Diploma in Chemical Engineering |
| Objective Type Questions (Chemical Engineering Plant Economics) |

**Unit 1: Basics of Process and Plant Design**

1) Chemical Engineer cannot be work in following department.

1. Research & Development
2. Design
3. Manufacture
4. Cable

2) Which is not base of chemical engineering

1. Maths
2. Chemistry
3. Physics
4. Zoology

3) Which is not require for Chemical Engineering designing

1. Mass & Heat Transfer
2. Process Calculation
3. Thermodynamics & Reaction Kinetics
4. Mining

4) The following statement is not true.

1. Continuous process is more economical than batch process
2. Continuous process can be controlled very easily
3. Batch process can be used for high rate of reaction
4. Batch process can be used for costlier product

5) The flow diagram gives the following information

1. Material flow
2. Energy flow
3. Above both
4. None of the above

6) There are following economic factor

1. Preliminary Process Appraisal
2. Cost and profit analysis
3. Above both
4. None of the above

7) Which steps includes in Cost and profit analysis

1. Manufacturing cost
2. Capital Investment
3. Above both
4. None of the above

8) Which is not to be considered in legal phase.

1. Patent
2. Public Relation
3. Contract
4. Mass flow Rate

9) The contract for the plant design includes.

1. Construction contract
2. Purchase contract
3. Above both
4. None of the above

10) Which plant is highly costly

1. Pilot Plant
2. Semi commercial plant
3. Commercial plant
4. None of the above

11) Which diagram takes more time to draw?

1. Material Balance Diagram
2. Energy Balance Diagram
3. Piping and Instrumentation Diagram
4. All of the above

12) Energy balance diagram depends on

1. Mass
2. Specific heat

3. Temperature
4. All of the above

13) Which diagram takes less time to draw?

1. Material Balance Diagram
2. Energy Balance Diagram
3. Piping and Instrumentation Diagram
4. All of the above

14) Which of the following plant takes more time to design?

1. Pilot Plant
2. Semi commercial plant
3. Commercial plant
4. None of the above

14) Which of the following plant takes less time to design?

1. Pilot Plant
2. Semi commercial plant
3. Commercial plant
4. None of the above

15) Which of the following does not come under the sales expenses for the product of chemical plant

1. Advertising
2. Warehousing
3. Legal Fees
4. Customer Service

16) Pick out wrong statement for continuous process

1. Always steady
2. Controlled very easily
3. Less labour requirement
4. Capital Investment is very high

17) Pick out right statement for Batch process

1. Always steady
2. Controlled very easily
3. Less labour requirement

4. Capital Investment is very high

18) Pick out wrong statement for pilot plant

1. Less space required
2. Low cost required
3. Less man power
4. Yielded high quality of product

19) Chemical Engineering Design includes

1. Process Design
2. Building Design
3. Equipment Design
4. All of the above

20) Auxiliary flow sheet gives the information on

1. Water
2. Power
3. Steam
4. All of the above

21) Instrumental flow sheet gives the information on

1. Pressure Indicator
2. Temperature Indicator
3. Flow Meter
4. All of the above

22) Piping diagram gives the information on

1. Bend
2. Valve
3. Pipe
4. All of the above

23) Which is not the unit of energy?

1. Kcal
2. BTU
3. KJ
4. m/s

24) Which one is not role of chemical engineer

1. Production Engineer

2. Quality Control Engineer
3. Plant Super wiser
4. Maintenance Engineer

25) The decision by a company management to implement a project is based entirely on

1. Obligation
2. Commitments
3. Economic Evaluations
4. None of The Above

26) The economic life of a small chemical plant is

1. Usually more than a large chemical plant
2. Usually much more than a large chemical plant
3. Usually much less than a large chemical plant
4. Always equal to a large chemical plant

27) Which plant requires large space?

1. Pilot Plant
2. Semi commercial plant
3. Commercial plant
4. None of the above

28) Which plant requires high man power?

1. Pilot Plant
2. Semi commercial plant
3. Commercial plant
4. None of the above

29) **The following is the preliminary stage of Production planning**

1. Capacity planning
2. Material requirements planning
3. Scheduling
4. Product development and design

**30) The following is the source(s) for developing new or improved product**

1. Research and Development department of the enterprise
2. Consumer suggestions and Complaints
3. Other competitive products in the market
4. All of the above

31) **Product cost can be reduced by considering the following aspect(s) at the design stage**

1. Minimum number of operations
2. Unnecessary tight tolerance should not be provided
3. Design should consist of standard parts
4. All of the above

32) **The following is not included in title block of drawing sheet.**

1. Sheet No
2. Scale
3. Method of Projection
4. Size of sheet

33) Water balance diagram shows the

1. Material balance of water and waste water
2. Material balance and energy balance of water and waste water
3. Energy balance of water
4. None of the above

34) Structural design of plants depends on

1. Wind load
2. Equipment load
3. Foundation
4. All of the above

35) Chemical Engineering Catalog gives the information on

1. Physical Properties
2. Chemical Properties
3. Thermodynamic Properties
4. All of the above

36) Pick up the right statement

1. Pilot plant is primary analysis of designing
2. Pilot plant is secondary analysis of designing
3. Both a and b
4. None of the above

37) Pick up right statement

1. Semi commercial plant is larger than pilot plant
2. Commercial plant is smaller than semi commercial plant
3. Both a and b
4. None of the above

38) Chemical engineering can do the

1. Analysis of raw material and product
2. Design of unit process
3. Design of unit operation
4. All of the above

39) A qualitative flow diagram indicates
1. The flow of materials
2. Unit operations involved
3. Special information on operating temperatures and pressures
4. All of the above

40) Instruments are used in the chemical industry to measure process variables, such as
1. Temperature
2. Pressure
3. Density
4. All of the above

41) A principle responsibility of the chemical engineer is
1. The design of Chemical Plant
2. Construction of Chemical Plant
3. Operation of Chemical Plants
4. All of the above

42) Personnel working in the market research group is responsible for the job of
1. Equipment selection
2. Product evaluation
3. Equipment design
4. Cost estimation

43) Scheduling provides information about the
1. Proper utilisation of machines
2. Means to minimise idle time for machines
3. Time of completion of job
4. Time of starting of job and also about how much work should be completed during a particular period

44) Process design is intended to include
1. Flowsheet development.
2. Process material and heat balances
3. Auxiliary services material and heat balances (utilities requirements)
4. All of the above

45) The Block diagram is uses
1. In survey studies
2. Process proposal for packaged steps
3. Talk out a processing idea
4. All of the above

46) Process Flow Diagram (PFD) is a document containing information on
1. Process conditions and physical data of the main process streams.
2. Main process equipment with design data.
3. Main Process lines
4. All of the above

47) Piping and Instrumentation Diagram includes

1. All process equipment identified by an equipment number
2. All pipes identified by a line size, material code and line number
3. All valves with an identified size and number.
4. All of the above

48) Material balance is useful tool for
1. The study of the plant operation & troubleshooting
2. Checking the performance against design
3. Checking the instrument calibration.
4. All of the above

49) Chemical Engineer can do the work in Product manufacturing department and sells department
1. True
2. False

50) Plant design includes Equipment design and optimization.
1. True
2. False

**Unit 2: Selection of Process Equipment and Piping**

1)Batch process is more efficient labour user than continuous process?
a) True
b) False

2) What is/ are the major type of equipment for nitration processing?
a) Batch process equipment
b) Continuous process equipment
c) Both of the mentioned
d) None of the mentioned

3) Which is more Flexible batch process or continuous process equipment?
a) Batch process equipment
b) Continuous process equipment
c) Flexibility does not affect the process
d) Both provide same flexibility

4) What size of equipment is needed in continuous process when compared with batch process?
a) Does not depend on size
b) Larger
c) Smaller
d) None of the mentioned

5) Which is safer Batch process or Continous process equipment?
a) Batch process

b) Continuous process
c) Both are equally safe
d) Both are unsafe

6) The pipes will expand considerably when the product temperatures are high and during cleaning.
a) True
b) False

7) _____ pump is also called as velocity pump.
a) Reciprocating
b) Rotary displacement
c) Centrifugal
d) Screw

8) Which pump is more suitable for an application where very high pressure is required to be developed at moderate discharge?
a) Reciprocating pump
b) Centrifugal pump
c) Turbine
d) None of the mentioned

9) Material handling consists of movement of material from
a. one machine to another
b. one shop to another shop
c. stores to shop
d. all of the above

10) Which of the following is an advantage of size reduction?
a) Enhanced heat/mass transfer
b) Intimate contact with certain food items
c) Enhanced heat/mass transfer & intimate contact with certain food items
d) None of the mentioned

11) Which of the following is NOT a method used for size reduction?
a) Cutting
b) Impact
c) Burning
d) Shear

12) A jaw crusher uses _____
a) Compression
b) Shear

c) Cutting
d) None of the mentioned

13) A ball mill uses _____
a) Impact
b) Attrition
c) Impact & Attrition
d) None of the mentioned

14) Which of the following uses attrition?
a) Ball mill
b) Plate mill
c) Roller mill
d) All of the mentioned

15) Stationary screens can be used for wet particles.
a) True
b) False

16) Brass is an alloy of

(a) copper and tin

(b) lead and tin

(c) copper and zinc

(d) copper and silver

17) The chief chemical property of aluminium is that it is
(a) soft (b) brittle (c) strong (d) tough

18) Which one of the following metals is corrosion resistant
(a) copper (b) mild steel (c) aluminium (d) tin

19) Bronze is an alloy of
(a) copper and tin (b) lead and tin (c) copper and zinc (d) copper and lead

20) There is a guaranty of standard equipment

1. Right
2. Wrong

21) Demand of Special equipment is very less

1. Right

2. Wrong

22) Cost of Special equipment is very less

1. Right
2. Wrong

23) Which of following size reduction equipment

1. Ball mill
2. Jaw Crusher
3. Roll Crusher
4. All of the above

24) Which of the physical property of material

1. Hardness
2. Moisture Content
3. Specific Gravity
4. All of the above

25) The column used for differential distillation is_____
a) Still
b) Differential column
c) Batch column
d) None of the mentioned

26) Simple distillation is a_____ process.
a) Batch
b) Continuous
c) Adiabatic
d) None of the mentioned

27) The top of the fractionators has _____ temperature.
a) High
b) Low
c) No
d) None of the mentioned

28) The bottom of the fractionators has a _____ temperature.
a) High
b) Low
c) No
d) None of the mentioned

29) Moisture removal from a material/ compound is known as drying.
a) True
b) False

30) The removal of acetone from acetone-benzene mixture is drying
a) True
b) False

31) Leaching is generally used for cement industries
a) True
b) False

32) Which of the following does not influence filtration?
a) Temperature
b) Density
c) Viscosity
d) pH

33) What do you mean by filter cake?
a) The cake which is to be filtered
b) A porous membrane used to retain the solids
c) The solids which are present on the filter
d) A suspension to be filtered

34) Which of the following process is used to separate insoluble particles from liquids?
a) Filtration
b) Extraction
c) Drying
d) Sieving

35) Plate and frame filter is a type of

A. Batch filtration
B. Continuous filtration
C. Both of above
D. None of above

36) Packed towers are _____
a) Absorption tower
b) Stripper
c) Absorber or Stripper
d) All of the mentioned

37) The humidity is represented in
a) Humidity chart

b) Psychometric chart
c) Psychometric chart or humidity chart
d) All of the mentioned

**Unit 3: Plant Layout and Location**

1) Which of the following industries should be located near the vicinity of raw materials?

a. Cycles
b. Televisions
c. Sewing machines
d. Steel mills

2) For which of the following industry humid climate is helpful

a. Cotton
b. Steel
c. Light Bulb
d. Automobile

3) The following type of layout is preferred to manufacture a standard product in large quantity

a. Product layout
b. Process layout
c. Fixed position layout
d. Combination layout

4) Transportation cost mainly depends on which of the following factors?

(a) Distance

(b) Weight of merchandise

(c) Time required for transportation

(d) All of the above

5)Process layout is also known as _____.

(a) Functional layout

(b) Batch production layout

(c) Straight line layout

(d) Both (a) and (b)

6) The flexibility in layout of factory building can be obtained by achieving

a. Expansion flexibility

b. Flexibility in building and services

c. Equipment flexibility

d. All of above

7) Poor quality adversely affects:
a) Costs
b) Productivity
c) Profitability
d) All of the given options

8) The transportation factor includes
a) Railway, Highway
b) Water, Pipeline
c) Both a) and b)
d) None of the above

9) Which one of the following does not influence industrial location?
(a) Raw material
(b) Capital and power
(c) Market and labour
(d) Underground railway line

10) Industries that use minerals as raw material are called

(a) Agro-based industries
(b) Forest-based industries
(c) Basic industries
(d) Mineral-based industries

11) The major factors for selection of plant location are raw material and market.
a) True
b) False

12) The minor factors for selection of plant location are land and utilities.
a) True
b) False

a) True
b) False

13) The plant should be located where
a) The maximum cost of production

b) The maximum cost of distribution
c) Both a) and b)
d) None of the above

14) The choice of the chemical plant site should be based on a complete survey of the advantages and
disadvantages of various geographical areas.
a) True
b) False

15) The major factors in the selection of most plant sites are
a) Raw materials, Markets, Energy Suply
b) Climate, Transportation Facilities, Water Supply
c) Both a) and b)
d) None of the above

16) Plant-design project involves the skills such as
a) Research, market analysis
b) design of individual pieces of equipment, cost estimation
c) Both a) and b)
d) None of the above

17) Plant design includes all engineering aspects involved in the development of either a new, modified, or expanded industrial plant.

a) False
b) True

18) The major factors in the selection of most plant sites are

a) Labour Supply, Site Characteristics
b) Flood and Fire protection
c) Both a) and b)
d) None of the above

19) The process industries use large quantities of water for
a) Cooling
b) washing
c)Steam Generation
d) All of the above

20) The characteristics of the land at a proposed plant site should be examined carefully.
a) False
b) True

21) Large scale industry must have

1) Only one gate
2) Only two gate
3) Three or more than three gate
4) None of above

22) Industrial plant must be in
1) Urban area
2) Special Economic Zone
3) Both 1) and 2)
4) None of the above

23) Dahej Special Economic Zone is located near
1) Surat
2) Valsad
3) Bharuch
4) Vadodara

24) Navin Fluorine International Ltd. industries is located in

1) Vadodara
2) Surat
3) Vapi
4) Jhagadia

25) Plant lay out consists _____for the safety point view

1) Fire Alarm
2) Assembly Point
3) Both 1) and 2)
4) None of the above

26) The components of steam power plant are
a) Evaporator, Condenser, Boiler, Expansion Valve
b) Evaporator, Condenser, Boiler, Turbine
c) Boiler, Turbine, Condenser, Pump
d) Boiler, Turbine, Pump, Expansion Valve

27) Laboratory Layout consists

a) Laboratory Plat Form
b) Sink
c) Fire Extinguisher
d) All of the above

28) Plant layout and piping design consists
a) Project data
b) Design and engineering data

c) Vendor data
d) All of the above

29) Project data consists the information such as
a) Plant Location, Local Codes, Regulation
b) Seismic Conditions,  Climate data
c) Both a) and b)
d) None of the above

30) Design and engineering data consists
a) Equipment Sizes, Mass flow rates
b) Service conditions such as temperature, pressure
c) Both a) and b)
d) None of the above

31) The layout of storage tank includes
1) Ladder
2) Dyke
3) Pump
4) All of the above

32) Fresh water carrying pipelines in chemical industries are coloured with _____ Colour
a) Sea Green
b) Brown
c) Yellow
d) Red

33) Which of the following is best tube material from thermal conductivity point of view alone?

Aluminium
Stainless Steel
Copper
Carbon Steel

**Unit 4: Investment, Cost Estimation & Depreciation**

1)Utilities cost in the operation of chemical process plant comes under the
plant overhead cost
fixed charges
direct production cost
general expenses

2)Which of the following is not a component of working capital ?

Raw materials is stock.
Finished products in stock.
Transportation facilities.
Semi-finished products in the process.

3. Which of the following relationship is not correct is case of a chemical process plant ?
Manufacturing cost = direct product cost + fixed charges + plant overhead costs
General expenses = administrative expenses + distribution & marketing expenses
Total product cost = manufacturing cost + general expenses
Total product cost = direct production cost + plant overhead cost.

4. In a chemical process plant: Manufacturing cost = direct product cost + fixed charges + plant overhead costs
True
False

5. In a chemical process plant: General expenses = administrative expenses + distribution & marketing expenses
True
False
6. In a chemical process plant: Total product cost = manufacturing cost + general expenses
True
False
7. In a chemical process plant : Total product cost = direct production cost + plant overhead cost.
True
False

8. Utility costs for ordinary chemical process plants ranges roughly from _____ percent of the total product cost.
l to 5
10 to 20
25 to 35
35 to 45

9) 'Utilities' in a chemical process plant includes
compressed air,
steam,
water,
All of above

10) 'Utilities' in a chemical process plant includes
electrical power,
oxygen,
fuel gases
All of above

11. The economic life of a large chemical process plant as compared to a small chemical plant is
only slightly more
much more
slightly less
almost equal

12. Cost of instrumentation in a modern chemical plant ranges from _____ percent of the total plant cost.
5 to 10
20 to 30
40 to 50
60 to 70

13. Which of the following is a component of working capital investment ?
Utilities plants.
Maintenance and repair inventory.
Process equipments.
Depreciation.

14. Annual depreciation costs are constant, when the _____ method of depreciation calculation is used.
declining balance
straight line
sum of the years digit
none of these

15. Annual depreciation cost are not constant when, the _____ method of depreciation calculation is used.
straight line
sinking fund
present worth
declining balance.

16. A machine has an initial value of Rs. 5000, service life of 5 years and final salvage value of Rs. 1000. The annual depreciation cost by straight line method is Rs.
300
600
800
1000

17. Which of the following is not a component of depreciation cost ?
Repairs and maintenance cost.
Loss due to obsolescence of the equipment.
Loss due to decrease in the demand of product.
Loss due to accident/breakdown in the machinery.

18. Which of the following is not a component of the working capital for a chemical process plant ?
Product inventory.
In-process inventory.
Minimum cash reserve.
Storage facilities.

19) A reactor having a salvage value of Rs. 10000 is estimated to have a service life of 10 years. The annual interest rate is 10%. The original cost of the reactor was Rs. 80000. The book value of the reactor after 5 years using sinking fund depreciation method will be Rs.
40096
43196
53196
60196

20) Total product cost of a chemical plant does not include the _____ cost.
market survey
operating labour, supervision and supplies
overhead and utilities
depreciation, property tax and insur-rance

21. Depreciation is _____ in profit with time.
decrease
increase
no change
none of these

22. Effluent treatment cost in a chemical plant is categorised as the _____ cost.
fixed
overhead
utilities
capital

23. The value of a property decreases _____ with time in straight line method of determining depreciation.
linearly
non-linearily
exponentially
logarithmically

24. The 'total capital investment' for a chemical process plant comprises of the fixed capital investment and the
overhead cost
working capital
indirect production cost
direct production cost

25. Purchased cost of equipments for a chemical process plant ranges from _____ percent of the fixed capital investment.
10 to 20
20 to 40
45 to 60
65 to 75

26. In a chemical process plant, the total product cost comprises of manufacturing cost and the
general expenses
overhead cost
R & D cost
none of these

27) The main object of providing depreciation is:
(a) To calculate true profit.
(b) To show true financial position.
(c) To reduce tax.
(d) To provide funds for replacement.

28) Depreciation arises because of:
(a) Fall in the market value of an asst.
(b) Physical wear and tear.
(c) Fall in the value of money.
(d) None of them.

29) Depreciation is a process of:
(a) Valuation
(b) Allocation
(c) Both valuation and allocation
(d) None of them.
30) Under the straight line method of providing depreciation it:
(a) Increase every year.
(b) Remain constant every year.
(c) Decreases every year
(d) None of them.

31) Total depreciation cannot exceeds its:
(a) Scrap value
(b) Cost value
(c) Market value
(d) Depreciable value

32) Depreciation value of an asset is equal to:
(a) Cost + Scrap value

(b) Cost + Market price
(c) Cost – Scrap value
(d) None of these

33) Depreciation is:
(a) An income
(b) An asset
(c) A loss
(d) A liability

34) Depreciation fund method is also known as:
(a) Sinking fund method
(b) Annuity method
(c) Sum of years digits method
(d) None of these

35) Double – declining method is often used in the:

(a) Pakistan
(b) South Africa
(c) Japan
(d) U.S.A

36) A machine has an initial value of Rs. 6000, service life of 6 years and final salvage value of Rs. 1800. The annual depreciation cost by straight line method is Rs.

600
700
800
1000

37) A machine has an initial value of Rs. 9200, service life of 8 years and final salvage value of Rs. 2000. The annual depreciation cost by straight line method is Rs.

600
700
800
900

**Unit 5: Profitability analysis**

1. The total investment in a project is Rs. 10 lakhs and the annual profit is 1.5 lakhs. If the project life is one year, then the simple rate of return on investment is
   a) 15%
   b) 10%
   c) 1.5%
   d) 150%
2. Nominal and effective interest rates are equal, when the interest is compounded
   a) quarterly
   b) semi-annually
   c) annually
   d) in no case, they are equal

3. Accumulated sum at the end of 5 years, if Rs. 10000 is invested now at 10% interest per annum on a compound basis is Rs.
   a) 15000
   b) 16105
   c) 18105
   d) 12500

4. Operating profit of a chemical plant is equal to
   a) profit before interest and tax i.e., net profit + interest + tax
   b) profit after tax plus depreciation
   c) net profit + tax
   d) profit after tax

5. In a manufacturing industry, break even point occurs, when the
   a) total annual rate of production equals the assigned value.
   b) total annual product cost equals the total annual sales.
   c) annual profit equals the expected value.
   d) annual sales equals the fixed cost.

6. _____ taxes are based on gross earnings.
   a) Property
   b) Excise
   c) Income
   d) Capital gain

7. If the interest rate of 10% per period is compounded half yearly, the actual annual return on the principal will be _____ percent.
   a) 10
   b) 20
   c) >20
   d) < 20

8. Payback period
   a) and economic life of a project are the same.
   b) is the length of time over which the earnings on a project equals the investment.
   c) Above both
   d) None of the above

9. "Break-even point" is the point of intersection of
   a) fixed cost and total cost.
   b) total cost and sales revenue.
   c) fixed cost and sales revenue.
   d) none of these.

10. The payback method for the measurement of return on investment
   a) gives a correct picture of profitability.
   b) underemphasises liquidity.
   c) does not measure the discounted rate of return.
   d) takes into account the cash inflows after the recovery of investments.

11. A series of equal payments (e.g., deposit or cost) made at equal intervals of time is known as
   a) perpetuity
   b) capital charge factor
   c) annuity
   d) future worth

12. Profit is equal to revenue minus
   a) book value
   b) total cost
   c) operating cost
   d) none of these

13. In financial accounting of a chemical plant, which of the following relationship is invalid?
   a) Assets = equities
   b) Assets = liabilities + net worth
   c) Total income = costs + profits
   d) Assets = capital.

14. A present sum of Rs. 100 at the end of one year, with half yearly rate of interest at 10%, will be Rs.
   a) 121
   b) 110
   c) 97
   d) 91

15. An investment of Rs. 100 lakhs is to be made for construction of a plant, which will take two years to start production. The annual profit from the operation of the plant is Rs. 20 lakhs. What will be the pay back time ?

a) 5 years
b) 7 years
c) 12 years
d) 10 years

16 .The Break-Even Chart is a graphical representation between cost, volume and profits.
True
False
17. Break-Even Chart does not show Fixed and Variable cost.

True
False

18. Pick out the wrong statement.

a) Gross revenue is that total amount of capital received as a result of the sale of goods or service
b) Net revenue is the total profit remaining after deducting all costs excluding taxes
c) The ratio of immediately available cash to the total current liabilities is known as the cash ratio
d) Consolidated income statement based on a given time period indicates surplus capital and shows the relationship among total income, costs & profit over the time interval

19. Gross revenue is that total amount of capital received as a result of the sale of goods or service
True
False

20. Net revenue is the total profit remaining after deducting all costs excluding taxes

True
False
21. The ratio of immediately available cash to the total current liabilities is known as the cash ratio
true

22. Which of the following are limitations of break-even analysis?

Static concept
Capital employed is taken into account.
Limitation of non-linear behavior of costs
Limitation of presence of perfect competition

23. Break-even analysis is used in “Make or Buy” decision.
True

24) An investor buys $1,000 worth of stocks and sells the shares two years later for $1,200. The net profit from the investment would be $200. How much return on investment ?

20%
30%
40%
50%

25) An investor buys $2,000 worth of stocks and sells the shares two years later for $2900. The net profit from the investment would be $900. Calculate return on investment.

20%
45%
50%
55%

26) An investment of Rs. 100 lakhs is to be made for construction of a plant. The annual profit from the operation of the plant is Rs. 20 lakhs. What will be the pay back time ?

a) 5 years
b) 7 years
c) 12 years
d) 10 years

27) Company C is planning to undertake a project requiring initial investment of $105 million. The project is expected to generate $25 million per year in net cash flows for 7 years. What is the payback period of the project.

7.2 Years
4.2 Years
3.2 Years
10.2 Years

28) Company B is planning to undertake a project requiring initial investment of $120 million. The project is expected to generate $20 million per year in net cash flows for 8 years. What is the payback period of the project.

4
5
6
7

29) Company E is planning to undertake a project requiring initial investment of $200 million. The project is expected to generate $40 million per year in net cash flows for 8 years. What is the payback period of the project.

4
5

6
7

30) Company F is planning to undertake a project requiring initial investment of $300 million. The project is expected to generate $30 million per year in net cash flows for 15years. What is the payback period of the project.

7 Years
8 Years
9 Years
10 Years

31) Calculate break-even point in sales units from following information:

| | |
|---|---|
| Price per Unit | $15 |
| Variable Cost per Unit | $7 |
| Total Fixed Cost | $9,000 |

1125 Units
1025 Units
925 Units
825 Units

32) Calculate break-even point in sales units from following information:

| | |
|---|---|
| Price per Unit | $10 |
| Variable Cost per Unit | $6 |
| Total Fixed Cost | $8500 |

1125
725
625
2125

33) Calculate break-even point in sales units from following information:

| | |
|---|---|
| Price per Unit | $20 |
| Variable Cost per Unit | $12 |
| Total Fixed Cost | $10000 |

1350
1250
1450
1550

34) What is break-even point in sales units from following information:

| | |
|---|---|
| Price per Unit | $25 |
| Variable Cost per Unit | $17 |
| Total Fixed Cost | $12000 |

1000
1200
1400
1500

**Unit 6: Optimum Design**

1. For a given fluid, as the pipe diameter increases, the pumping cost
   a) decreases.
   b) increases.
   c) remains the same.
   d) may increase or decrease, depending upon whether the fluid is Newtonian or non-Newtonian.

2.. In which of the electric power generation system, the operating cost is minimum ?
   a) Thermal
   b) Nuclear
   c) Hydroelectric
   d) Fast breeder reactor

3. Which of the following is the costliest material of construction used in pressure vessel construction ?
   a) Low alloy steel
   b) Lead
   c) Titanium
   d) High alloy steel

4. Which of the following is the cheapest material of construction for the storage of sodium hydroxide upto a concentration of 75% ?
   a) Stainless steel
   b) Plain carbon steel
   c) Nickel
   d) Copper

5. Optimum economic pipe diameter for fluid is determined by the
   a) viscosity of the fluid.
   b) density of the fluid.
   c) total cost considerations (pumping cost plus fixed cost of the pipe).
   d) none of these.

6. Which of the following ceramic packing materials is the costliest of all ?
   a) Berl saddles
   b) Raschig rings
   c) Pall rings
   d) Intalox saddles

7. Which of the following is the cheapest material of construction for the storage of sodium hydroxide up to a concentration of 75%?

   a) Stainless steel

   b) Plain carbon steel

   c) Nickel

   d) Copper

8. Chose the correct one with respect to the critical radius of insulation
There is more heat loss i.e. conductive
There occurs a decrease in heat flux
Heat loss increases with addition of insulation
Heat loss decreases with addition of insulation
Answer: c

9. The process of direct transmission of heat through a material is known as _____
Conduction
Radiation
Thermal insulation
Thermal energy
View Answer

10. Thermal insulation keeps the room cool in winters and hot in summers.
a) True
b) False
View Answer

11. Which of the following is not a quality of a good thermal insulating material?
It should be durable
It should have a low thermal resistance
It should be readily available
It should be fireproof

12. Which of the following is a quality of a good thermal insulating material?
It should be durable
It should be readily available
It should be fireproof

All of above

13. The economic thickness of insulation depends on
The first cost (insulating cost)
Maintenance cost of insulation
Annual value of heat loss
All of above

14. Maximum value of critical radius is
0.01 m
0.04 m
0.06 m
0.0001 m
View Answer

15. Energy balance optimization is a prime factor for setting
Operations
Cost
Reflux
Feed

16.For a given fluid, as the pipe diameter decreases, the pumping cost
decreases.
increases.
remains the same.
may increase or decrease, depending upon whether the fluid is Newtonian or non-Newtonian.

17. Fixed expenses decrease per unit with the increases in production and increases per unit with the decrease in production.
True
False

18. Optimization means finding a best from available option.
True
False

19. The first step in the development of an optimum design is to determine what factor is to be optimized.
True
False
20. In the determination of optimum conditions, the same final results are obtained with either graphical or analytical methods.
True
False

21. The optimum thickness of insulation is found at the minimum point on the curve obtained by plotting total variable cost versus insulation thickness.
True
False
22. The slope of the total-variable-cost curve is not zero at the point of optimum insulation thickness.
True
False

22. _____ is required in Analytical method of optimization.

Calculation
Graph
Above both
None of the above

23. _____ is required in Graphical method of optimization.
Calculation
Graph
Above both
None of the above

24. By the Analytical method of optimization the derived result is _____.

Accurate
Sometimes wrong
Always wrong
None of the above

25. Graphical method of optimization can be represented very easily.
True
False

26. Which one is last stage for designing of chemical plant
Material Balance
Energy Balance
Piping design
Optimization

27 The hot pipe is surrounded by insulating material. If thickness of the insulating material increases the heat loss_____.

Increase
Decrease
Remains constant
None of the above

28 The hot pipe is surrounded by insulating material. If thickness of the insulating material increases the insulation cost_____.

Increase
Decrease
Remains constant
None of the above

29. The reactor is surrounded by insulating material. If thickness of the insulating material reduces, the insulation cost_____.
Increases
Decreases
Remains constant
None of the above

30. If there is not a money problem, _____is not required.

Material Balance
Energy Balance
Optimization
None of the above

31. _____ is the cheapest material available from market.

Sodium Chloride
Sodium Hydroxide
Sodium Cyanide
Sodium gluconate

32. Which one is the costlier material available from market.
Sodium Chloride
Platinum
Sodium Carbonate
Potassium Cyanide