

COURSE: ORGANIC CHEMICAL TECHNOLOGY

I. MULTIPLE CHOICE QUESTIONS

1. Which of the following statement is not true in case of isomerisation of butane?

- (a) Increase in LHSV will tend to increase in isobutene yield
- (b) Increase in temperature will increase isobutane yield
- (c) Increase in temperature will decrease isobutane yield
- (d) Reducing hydrogen to hydrocarbon ratio will be decreased

2. For highly paraffinic crude oil, the characterisation factor will be in range of

- (a) 11.5-12.5
- (b) 12.5-13.0
- (c) 13.5-14.0
- (d) 14.5 -15.0

3. During the desalting of crude oil which of the statement is not true?

- (a) Desalter pressure is maintained above vaporisation pressure of crude oil
- (b) Desalter pressure is maintained below vaporisation pressure of crude oil
- (c) Low voltage is preferable for better desalting
- (d) Lower temperature is preferable

4. Which of the Indian oil refinery is making Linear alkyl benzene?

- (a) IOC Panipat refinery
- (b) IOC Haldia refinery
- (c) IOC Vadodara refinery
- (d) IOC Mathura refinery

5. Which of the following statement is not true in case of catalytic reforming?

- (a) High temperature results in loss of reformate yield
- (b) Highly naphthenic stock require high space velocity
- (c) High paraffinic stock requires low space velocity
- (d) Presence of water decrease the hydrocracking activity

6. Which of the following process is not sorbent separation technology?

- (a) Penex
- (b) Parex
- (c) Molex
- (d) Olex

7. Which of the following statement is not true in case of catalytic reforming?

- (a) Dehydrogenation is highly endothermic
- (b) Dehydrogenation is exothermic
- (c) Dehydrocyclisation reaction is exothermic
- (d) Hydrodealkylation reactions are endothermic

8. Match the following

List I

- a. Cavitation
- b. Surging
- c. Weeping
- d. Slugging

List II

- e. Fans & Compressor
- f. Centrifugal pump
- g. Distillation
- h. Fluidisation

9. If the crude is paraffinic then its characterization factor will be?

- (a) 5
- (b) 8
- (c) 11
- (d) above 12

10. Ring number is used to express?

- (a) TBP
- (b) Thermoviscosity
- (c) Aromatic content
- (d) Boiling point

11. Smoke Volatility index is expressed as?

- (a) Smoke point = $0.42 \times (\text{percentage distilled at } 204^\circ\text{C})$
- (b) Smoke point = $1.42 \times (\text{percentage distilled at } 204^\circ\text{C})$
- (c) Smoke point = $2.42 \times (\text{percentage distilled at } 204^\circ\text{C})$
- (d) Smoke point = $3.42 \times (\text{percentage distilled at } 204^\circ\text{C})$

12. If diesel has cetane number of 50 then the diesel index will be?

- (a) 36
- (b) 46
- (c) 56
- (d) 66

13. Which of the following is not adsorptive separation process?

- (a) Parex
- (b) Olex
- (c) Molex
- (d) Penex

14. Which of the following term is not related to adsorption?

- (a) Bromine number
- (b) Iodine number
- (c) Breakthrough
- (d) Molasses number

15. Bromine number is measure of?

- (a) Paraffins
- (b) Unsaturation
- (c) Saturates
- (d) Aromatics

16. Which of the following expression is not true in case of fluid catalytic cracking?

- (a) Combustion factor = (regenerator dense phase temp - riser out let temper) / coke yield
- (b) Combustion factor = (regenerator dense phase temp - riser out let temper) / Δ coke
- (c) Combustion factor = (riser out let temper - regenerator dense phase temp) / Δ coke
- (d) Combustion factor = (riser out let temper - regenerator dense phase temp) / coke yield

17. Match the following

List I

- a. Merox process
- b. Ehermax Process
- c. Claus process
- d. Merox

List II

- e. Oxygenates
- f. n-parffins
- g. H₂S removal
- h. Sulphur recovery

18. Aviation Fuel Contains?

- (a) Light Naphtha
- (b) Medium Naphtha
- (c) Kerosene
- (d) Diesel

19. Which of the following is for the manufacture of linear alkyl benzene?

- (a) Kerosene
- (b) Naphtha
- (c) Gas Oil
- (d) Diesel

20. Pyrolysis gasoline is obtained from?

- (a) Catalytic cracking
- (b) Gasification
- (c) Steam cracking
- (d) Thermal cracking

21. Which type of the coal is preferred for metallurgical coal?

- (a) Lignite
- (b) Bituminous coal
- (c) Peat
- (d) Anthracite coal

22. Whit liquor in Kraft pulping contains?

- (a) NaOH
- (b) NaOH and Na₂S
- (c) NaOH + Na₂CO₃ + Na₂S
- (d) NaOH + NaCO₃

23. Which of the following term is not used in pulping?

- (a) Kappa number
- (b) Copper number
- (c) Bromine Number
- (d) Permanganate number

24. Which of the following give higher fibre strength?

- (a) Eucalyptus
- (b) Pine
- (c) Bagasse
- (d) Wheat straw

25. Purpose of sizing is?

- (a) To increase the strength
- (b) To improve formation
- (c) To increase resistance toward water
- (d) To improve the bursting strength

26. Which of following is used as make up chemical in Kraft process?

- (a) Na_2CO_3
- (b) Na_2SO_3
- (c) Na_2SO_4
- (d) NaOH

27. Which of the crude has higher sulphur content?

- (a) Assam crude
- (b) Gujarat crude
- (c) Rajasthan crude
- (d) Bombay high crude

28. Which of the following is not oxygenate?

- a) MTBE
- b) TAME
- c) MEK
- d) ETBE

29. Which of the following will have higher API gravity?

- (a) Gas Oil,
- (b) Gasoline
- (c) Crude Oil
- (d) Kerosene

30. Aniline point is related to?

- (a) Octane number
- (b) Diesel number
- (c) Smoke
- (d) Point pour point

31. VGC of crude oil is around?

- (a) 0.1- 0.2
- (b) 0.3 - 0.4
- (c) 0.5- 0.7
- (d) 0.8 - 0.9

32. Which of the following is used in LAB manufacture?

- (a) Parex
- (b) Olex
- (c) Molex
- (d) Cyex

33. Characterization factor for paraffin base is around?

- (a) 2
- (b) 9
- (c) 11
- (d) 12

34. Which of the following is not thermal cracking?

- (a) Fluid coking
- (b) Flexi coking
- (c) Uniflex
- (d) MSCC

35. Which of the following is not used for manufacture of Nylon 66?

- (a) Adipic acid
- (b) Hexamethylene diamine
- (c) Hexa methylene triamine
- (d) Ethylene glycol

36. Caprolactam is raw material for?

- (a) Nylon 4
- (b) Nylon 6
- (c) Nylon 7
- (d) Nylon 66

37. Which of the following is true?

- (a) Increasing tube diameter increases yield of ethylene
- (b) Increasing tube diameter decreases yield of propylene
- (c) Use of steam reduces the selectivity towards higher olefin production
- (d) Use of steam increases the selectivity towards higher olefin production

38. Which of the following is used for making polycarbonate?

- (a) Phenol
- (b) Catechol
- (c) Resorcinol
- (d) Bis Phenol

39. Which of the following is herbicide?

- (a) 2,4 D
- (b) Diuron
- (c) Fluchloralin
- (d) DDT

40. Which of the following is used as gamacine?

- (a) BHC
- (b) DDT
- (c) Dieldrin
- (d) Diuron

41. Which of the following is not used in dye?

- (a) Anthraquinone
- (b) Meanic Acid
- (c) Gamma Acid
- (d) Picolin

42. Which of the following is used for manufacture of azo dyes?

- (a) Beta Naphthol
- (b) Aniline
- (c) Tobias Acid
- (d) Anthaquinone

43. Dry spinning process is used for spinning of?

- (a) Nylon
- (b) Polysetser
- (c) Acrylic fibre
- (d) Viscose rayon

44. LAB is manufacture in?

- (a) IOC Panipat refinery
- (b) IOC Vadodara refinery
- (c) IOC Digboi refinery
- (d) IOC Mathura refinery

45. Which of the refinery produces terephthalic acid?

- (a) Jam Nagar refinery
- (b) IOC Panipat refinery
- (c) IOC Vadodara refinery
- (d) BPCL Guna refinery

46. Which of the following is not thermoplastic?

- a. Polyester
- b. PVC
- c. Polyethylene
- d. Phenol formaldehyde

47. Which of the coal has highest volatile matter?

- (a) Lignite
- (b) Peat
- (c) Bitumen
- (d) Anthracite

48. Which of the following is thermo set resin?

- a. Epoxy resin
- b. PET resin
- c. Polycarbonate
- d. Fluorocarbon

49. Which of the following fibre contains polyurethane?

- a. Dynel
- b. Spandex
- c. Orlon
- d. Saran

50. Which of the following involve poly condensation?

- a. Acrylic
- b. Polyethylene
- c. Polyester
- d. Nylon

51. Chloroprene used in manufacture of?

- a. Neoprene
- b. Thikol
- c. Butyl rubber
- d. Nitrile rubber

52. Which of the following have comonomer?

- a. PVC
- b. Nylon 6
- c. Nylon 66
- d. Polybutadiene

53. Which of the following is made from hexamethylene diamine and adipic acid?

- a. Nylon 66
- b. Nylon 6
- c. Terylene
- d. Dacron

54. Bakelite is made from?

- a. Phenol formaldehyde
- b. Urea formaldehyde
- c. Melamine Formaldehyde
- d. None of these

55. Which of the following is not used in case of Polyurethane?

- (a) Polyols
- (b) Hexa methylene diisocyanate
- (c) Hexamethylene diamine
- (d) Adipic acid

56. For which of the following driving force is concentration difference?

- a. Reverse osmosis
- b. Nano filtration
- c. Dialysis
- d. Electrodialysis

57. Which of the following highest octane number?

- a. n-butane
- b. i-pentane
- c. Octane
- d. Toluene

58. Which of the following is not used as oxygenates?

- (a) MTBE
- (b) TAME
- (c) MEG
- (d) Ethanol

59. If a fuel has high aniline point then which of the statement is true?

- (a) Fuel has low paraffin
- (b) Fuel has high aromatics
- (c) Fuel has low diesel index
- (d) Fuel has high diesel index

60. Major source of propylene in refinery is?

- (a) Catalytic reforming
- (b) Vis breaking
- (c) Fluidised bed catalytic cracking
- (d) Iso craking process

61. Propane in petroleum refining is used for the removal of?

- (a) Asphalt
- (b) Wax
- (c) Sulphur compound
- (d) Aromatics

62. As per the Bharat II norms for gasoline the benzene content should be?

- (a) 1 percent
- (b) 2 percent
- (c) 3 percent
- (d) 4 percent

63. Which of the following type of crude oil contains lowest wax content?

- (a) Asphalt base
- (b) Paraffin based
- (c) Mixed based crude
- (d) Naphthenic based

64. Which of the following hydrocarbons having API gravity mentioned below will have highest sulphur content?

- (a) 10
- (b) 20
- (c) 30
- (d) 40

65. Cambay basin is located near?

- (a) Mumbai
- (b) Kandla
- (c) Chennai
- (d) Haldia

66. Which of the following is in Edeleanu process?

- (a) Propane
- (b) Dimethyl formamide
- (c) SO₂
- (d) Furfural

67. Which of the following will have highest API gravity?

- (a) Ethane
- (b) Propane
- (c) Butane
- (d) Heptane

68. Materials used for increasing ash fusion temperature of feed stocks in gasifier is?

- (a) Acidic oxides like SiO₂
- (b) Alkali metal oxides
- (c) H₂SO₄
- (d) Alcohol

69. Catalyst used for low temperature shift reaction is? 1

- (a) Cu/ZnO/Al₂O₃
- (b) Fe₂O₃-Cr₂O₃
- (c) Fe₂O₃
- (e) CuO/ZnO

70. EIL-IIP propane deasphalting technology is working in?

- (a) HPCL Mumbai refinery
- (b) Numaligarh refinery
- (c) Mathura refinery
- (d) Panipat refinery

71. Which one is not carbon rejection technique for residue up-gradation?

- (a) Solvent deasphalting
- (b) Gasification
- (c) FCC
- (d) Delayed coking

72. Match the following?

- | List I | List II |
|---------------------|-------------|
| a. Smoke point | e. MTBE |
| b. Aniline point | f. Thiopene |
| c. Sulphur compound | g. Kerosene |
| d. Oxygenate | h. Diesel |

73. Petroleum feed stock used for linear alkyl benzene is?

- (a) Crude oil
- (b) Kerosene
- (c) Diesel
- (d) Light cycle oil

74. Which of the following has higher characterization factor?

- (a) Paraffinic base crude oil
- (b) Naphthenic base
- (c) Intermediate base
- (d) Cracked gasoline

75. For toilet soap of Grade I minimum percentage of TFM (total fatty material) should be?

- (a) 40
- (b) 60
- (c) 70
- (d) 76

76. If a crude has specific gravity of 0.8576 and characterisation factor of 11.66 then its average boiling point in °C will be?

- (a) 238.8
- (b) 298.8
- (c) 398.8
- (d) 498.8

77. As per the Euro III norms for gasoline the benzene content should be?

- (a) 1 percent
- (b) 2 percent
- (c) 3 percent
- (d) 4 percent

78. Cyclo process is used for the manufacture of?

- (a) Isobutylene
- (b) Polyethylene
- (c) Aromatics
- (d) (Linear alkyl benzene)

79. Optimum kinetic severity function for higher ethylene production is maintained around?

- (a) 1.5
- (b) 2.5
- (c) 3.5

(d) 4.5

80. Steam consumption in steam cracker plant is high in case of?

- (a) Ethane
- (b) Gas oil
- (c) Naphtha
- (d) Propane

81. Which of the following is true?

- (a) Increasing tube diameter increases yield of ethylene
- (b) Increasing tube diameter decreases yield of propylene
- (c) Use of stem reduces the selectivity towards higher olefin production
- (d) Use of steam increases the selectivity towards higher olefin production

82. First gas cracker plant is located at?

- (a) Digboi
- (b) Haldia
- (c) Jam Nagar
- (d) Nagothane

83. For LAB which fraction of the kerosene is used

- (a) Paraffins
- (b) Olefins
- (c) Benzene
- (d) Xylene

84. Match the following

List I

- a. Autotherma reforming
- b. Alkylation
- c. Parex process
- d. Dehydrogenation

List II

- e. LAB
- f. p-xylene
- g. Olefins
- h. Synthesis gas

85. Which of the following will have lowest API gravity?

- (a) Crude oil
- (b) Diesel
- (c) Asphalt
- (d) Gas oil

86. As per the Bharat III norms for gasoline the benzene content should be?

- (a) 1 percent
- (b) 2 percent
- (c) 3 percent
- (d) 4 percent

87. In case of catalytic reforming dehydrogenation of naphthenes to aromatics is?

- (a) Favoured by increase in temperature and decrease in pressure
- (b) Favoured by increase in temperature and increase in pressure
- (c) Favoured by decrease in temperature and decrease in pressure
- (d) None of these

88. Udex process is used for extraction of?

- (a) Aromatics
- (b) Butenes
- (c) Wax
- (d) Paraffins from Kerosene

89. Which of the following statement is not true in case of catalytic reforming?

- (a) High temperature results in loss of reformate yield
- (b) Highly naphthenic stock require high space velocity
- (c) High paraffinic stock requires low space velocity
- (d) Presence of water decrease the hydrocracking activity hydrocracking

90. Which of the following is not used as oxygenates?

- (a) MTBE
- (b) TAME
- (c) MEG
- (d) Ethanol

91. If a fuel has high aniline point then which of the statement is true?

- (a) Fuel has low paraffin
- (b) Fuel has high aromatics
- (c) Fuel has low diesel index
- (d) Fuel has high diesel index

92. Major source of propylene in a refinery is?

- (a) Catalytic reforming
- (b) Visbreaking
- (c) Fluidised bed catalytic cracking
- (d) Iso craking process

93. In Alkylation process, which of the following is not used as catalyst?

- (a) HF
- (b) H₂SO₄
- (c) Solid acid catalyst
- (d) Mixed acid (H₂SO₄ and HNO₃)

94. Isochronal test is used for measuring?

- (a) Smoke point
- (b) Asphalt content
- (c) Wax content
- (d) Back pressure of testing well

95. For extraction of which of the following UDEX process is used?

- (a) Aromatics
- (b) Butenes
- (c) Wax
- (d) Paraffins from Kerosene

96. In case of which of the following process Snowballing term is used in case of?

- (a) Fluidised bed cracking
- (b) Crude oil distillation
- (c) Hydrodesulphurisation processes
- (d) Aromatic extraction

97. Steam consumption in steam cracker plant is high in case of?

- (a) Ethane
- (b) Gas oil
- (c) Naphtha
- (d) Propane

98. Glycerine is produced during production of?

- (a) Soap
- (b) Detergent
- (c) Grease
- (d) None of these

99. Which of the coal has highest percentage of carbon?

- (a) Peat
- (b) Bitumen
- (c) Anthracite
- (d) Lignite

100. Knocking is the term used for

- (a) Diesel
- (b) Gasoline
- (c) Jet fuel
- (d) Kerosene

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II. FILL UP THE BLANKS

1. Lighter feed stock will have.....API gravity than the lighter feedstock.
2. Heavier feed stock contains.....sulphur compound.
3. For kerosene the preferred feed stock is
4. Feed stock having higher paraffins will yield gasoline of.....octane number.
5. Naphtha cracker plants are normally operated in kinetic severity index range of.....
6. BMCI index stands for... ..
7. Low BMCI means crude is more
8. Crude oil having density of 0.82 will have API gravity of.....
9. Lighter hydrocarbon will havereid vapour pressure than the heavier hydrocarbon.
10. Presence of aromatics in kerosene will result in.....
11. Major constituent of gas hydrate is.....
12. To have higher octane number the feed stock should have higher.....
13. Kerosene is major feed stock forpetrochemical.
14. Crude oil having higher VGC will be.....
15. Preferred feed stock for lube oil refinery is.....
16. High aniline point indicates
17. In SOHIO process acrylonitrile is made from.....
18. Nylon 6 has.....melting point than Nylon 66.
19. Spinning of Nylon 6 is done by.....
20. In India caprolactam is manufactured by.....
21. Cyclohexane is made from.....
22. Major raw material for terephthalic acid are.....
23. Nylon salt is made from the reaction of.....
24. Various spinning processes care.....
25. Dimethyl formide is used for spinning of.....
26. Various feed stock for Caprolactam manufacture are.....

27. Methanol is by product during polymerization of..... for manufacture of polyester.
28. MEG is manufactured of.....
29. Nylon 66 is made from polymerization of.....
30. Spinning of polyester is done for.....
31. Major byproduct obtained during manufacture of Acrylonitrile is.....
32. During manufacture of caprolactam major byproduct produced is.....
33. Beckman rearrangement reaction is used for the manufacture of.....
34. Acrylic fibre is used as substitute of.....
35. Parex process is used for separation of.....
36. Chloride content of feed to reformer should be.....
37. In the production of olefin from cracker plants refrigeration is achieved by using.....
38. Purpose of addition of oxygenates in the gasoline are.....
39. Aniline point is measure of.....
40. Olex process is based on.....
41. Nylon salt is made by the reaction of..... and.....
42. VGC for paraffinic base feed stock isthan naphthenic base.
43. TBP term is used for.....
44. Opportunity crude are.....
45. Various temporary poisons are removed by.....
46. In the refinery propylene is recovered from.....
47. Nylon 6 is preferred over nylon 66 because.....
48. For metallurgical coke prefer coal is.....
49. CBM stands for.....
50. In proximate analysis of coal various parameters dermine d are.....
51. Producer gas consist of
52. Ammonium sulphate in steel plant is made from.....
53. In cyclar process feed stock is
54. Purpose of sizing is
55. In cooking of agricultural residue cooking liquor is
56. Major share in News print paper is

57. Commercial name of phenol formaldehyde is
58. Purpose of black liquor oxidation is.....
59. Causticization of green liquor is done.....
60. Higher sulphidity in case of Kraft pulping increases.....
61. Make up chemical used in Kraft pulping is.....
62. In evaporation of black liquor feed arrangement is
63. Increasing residence time in naphtha cracker will result in decrease in
64. Decreasing tube diameter in naphtha cracker will result in
65. DDT stands for.....
66. IGRS stands for.....
67. Beckmann rearrangement is
68. Carbonylation reactions involve reaction of.....
69. Hofman Process reaction involve
70. Fisher-Tropsch (FT) Process is used for
71. In manufacture of TNT catalyst used is.....
72. Sulphonation involves
73. Sulphilation involves
74. Crsex process is used for separation of.....
75. Cymex process is used for separation of
76. Reaction involve in production of PVC from acetylene route is.....
77. Reaction involve in manufacture of vinyl chloride from molasses route is.....
78. Reaction involve in manufacture of polycarbonate is.....
79. Epoxy resin is formed by reaction of.....
80. During manufacture of alcohol spent wash is produced during.....
81. Ethylene from molasses based plant is from.....
82. In kitchen ware normally thermoset resin used is.....
83. Sulphur content in the naphtha before catalytic reforming should be below.....
84. Characterisation factor for aromatics will be than paraffins.
85. Metallic function of catalyst in catalytic reforming promotes the.....
86. Reaction involve in disproportionation of toluene is.....
87. Cingealing point is used in case of

88. Various bleaching chemical used for bleaching of pulp are.....
89. A crude having API gravity of 63.5 will have density of.....
90. For production of p-xylene naphtha feed stock should have boiling around.....
91. Increasing the temperature in catalytic reforming
92. MTBE is made from reaction of and.....
93. Chemicals used in acid sizing are.....
94. The chromophore in azo group of dyes is.....
95. Basic dyes are mostly.....
96. Vat dyes are mostly derivative of
97. 2-4 D (2-4, Dichlorophenoxyacetic Acid) is a.....
98. Some of the important biocides are.....
99. For linear alkyl benzene normally feed having carbon atomare preferred.
100. Kerogen is a term used in case of.....

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I. MODULE I - INTRODUCTION

DESCRIPTIVE QUESTIONS

1. What are various separation processes used in organic chemical industry?
2. What are the various raw materials for chemical industry?
3. Describe the various product derived from biomass?
4. What are the various alternative routes for organic chemicals?
5. Describe the structure of chemical industry?
6. Describe the various unit operations used in chemical process industry?
7. Describe the various unit processes used in chemical industry?
8. What are the various raw materials for organic chemicals? Describe the importance of petroleum in development of organic chemical industry?
9. Describe the major products of chemical industries and their area of application?
10. Describe the major technological development in chemical industries?
11. What are typical issues in chemical industry to meet the future challenges?
12. Describe the various routes making chemicals?
13. What are the various Unit operations used in chemical industries?

DIFFERENTIATE BETWEEN

1. Shale gas, and Gas hydrate
2. Coal bed methane and Natural gas
3. Associated and Non associated gas
4. Unit operation and Unit Processes
5. Sulphonation and Sulpation
6. Sublimation and crystallization
7. Adsorption and Absorption
8. Metallurgical coke and Petrocoke
9. Ultra-filtration and Reverse osmosis
10. Dialysis and Electrodialysis

11. Hydroformilation and Carbonylation
12. Reforming and Autothermal reforming
13. Etherification and Esterification
14. Biomass and Algae

II. MODULE II - COAL AND COAL CHEMICALS

DESCRIPTIVE QUESTIONS

1. What are various routes for production of chemicals from coal?
2. What are the various coal chemicals chemical derived from ethyl alcohol?
3. Describe the various coal gasification processes. What are the various type of gasifier used for coal gasification?
4. Describe a coke oven plant? What are the products derived from coke oven plant?
5. What is Petrocoke? What are the various uses of petrocoke?
6. Describe the gasification of biomass and product derived from it?
7. What are major problems in utilization of Indian coal?
8. Describe the partial oxidation and steam reforming process?
9. Describe the gasification process for the manufacture of syn. gas?
10. What is the advantage of autothermal reforming?

DIFFERENTIATE BETWEEN

1. Lignite and Peat
2. Bitumen coal and anthracite coal
3. Proximate analysis and Ultimate analysis
4. Gasification and Pyrolysis
5. Carbonization and Gasification
6. Underground coal gasification and Surface coal gasification
7. Low temperature and High temperature carbonization
8. Proven reserve and Indicated reserve
9. Partial oxidation and autothermal reforming

10. Reforming and autothermal Reforming

III. MODULE III - PULP AND PAPER

DESCRIPTIVE QUESTIONS

1. Discuss the status of paper industry in India. What are short comings and major challenges for improving economy of paper industry?
2. Describe the Kraft pulping process? What are various development has taken place in pulping and bleaching?
3. Describe the manufacture of paper using agricultural residues?
4. Describe the Kraft recovery process?
5. What are the various problem associated in recovery of chemicals from agricultural residue? Describe the processes for recovery of chemical from agro based black liquor?
6. Describe the manufacture of newsprint? What are the requirement of a good newsprint?
7. Describe the pulping of bagasse? How a paper mill can be integrated with sugar mill?
8. What is the purpose of beating and refining? What is the advantage of disc refiner over conventional refiner?
9. Describe the process of sizing? What is the advantage of alkaline sizing over acid sizing?
10. What is the difference between a Fourdiener machine and Mould machine?
11. Describe the role of wastepaper in paper making? Describe the process of paper making using waste paper?
12. Describe the process of paper making from waste paper? What is the advantage of waste paper over conventional raw material?

DIFFERENTIATE BETWEEN

1. Refining and Beating
2. Internal sizing and Surface sizing
3. Acid sizing and Alkaline sizing
4. Fourdiener machine and Mould machine

5. Fourdiener Machine and Yankee machine
6. Causticity and Causticizing efficiency
7. Total titratable alkali and active alkali
8. Sulphidity and Causticity
9. Black liquor and Green Liquor
10. Green Liquor and white Liquor
11. Writing Paper and News Print
12. Refiner mechanical pulp and thermo mechanical pulp
13. Conical Refiner and disc Refiner
14. Permanganate Number and Copper number
15. Dilution factor and Bath ratio
16. Uniflow Cylinder vat and Counter flow cylinder vat

IV. MODULE IV - SOAP AND DETERGENT

DESCRIPTIVE QUESTIONS

1. What are various raw materials for soap industry? Describe the manufacture of soap?
2. Describe the manufacture of linear alkyl benzene (LAB)? What is advantage of LAB based detergent over other raw material?
3. Describe requirement of kerosene for linear alkyl benzene?
4. Describe the solid acid catalyst based process for manufacture of linear alkyl benzene?
5. What is the advantage of solid acid catalyst over the conventional HF acid catalyst? Describe the LAB process using solid acid catalyst?
6. What are the various components of detergent? What is advantage of detergent over conventional washing soap?
7. What are the uses of glycerine? Describe the glycerine recovery process?

DIFFERENTIATE BETWEEN

1. Soap and Detergent
2. Anionic and Cationic detergent

3. Ethoxylate and Non ionic detergent
4. Solid and Liquid detergent
5. Molex and Pacol process
6. Biodegradable and Non-biodegradable detergent
7. Washing soap and Bathing soap
8. Natural fatty alcohol and Petro based alcohol
9. Sulphuric acid alkylation and HF alkylation
10. Solid detergent and Liquid detergent
11. Toilet soap and Bathing soap
12. Specialty surfactants and Commodity surfactants

V. MODULE V - SUGAR AND FERMENTATION INDUSTRY

DESCRIPTIVE QUESTIONS

1. Describe the manufacture of sugar? What are various by products from sugar industry?
2. How can you integrate a sugar plant, paper unit and chemical plant for the production of sugar, paper and chemicals?
3. What are the various chemicals derived from ethyl alcohol?
4. Describe the manufacture of alcohol from molasses? What are the various uses of alcohol?
5. What are the various routes for making alcohol?
6. Describe the role of ethanol as fuel? What are the advantages of using alcohol in gasoline?

DIFFERENTIATE BETWEEN

1. Carbonation and Sulphilation
2. Molasses and Spent wash
3. Press mud and Fermenter sludge
4. Gasoline and Gashol
5. Biomass gasification and Pyrolysis

VI. MODULE VI - PETROLEUM REFINING

DESCRIPTIVE QUESTIONS

1. Describe the various parameters used in evaluation base of crude oil?
2. What is the advantage of crude oil evaluation?
3. What are the opportunity crudes? What are the problems associated with utilization of opportunity crude?
4. Describe the desalting process and its importance?
5. Describe the crude oil distillation process. What are the various products from crude oil distillation?
6. Describe the Process of hydrotreatment of naphtha for catalytic reforming?
7. What are the various reactions involved in catalytic cracking? Describe the FCC process?
8. What are the various alkylating agents? Describe the alkylation for production of gasoline?
9. What is the advantage of solid acid catalyst and acid catalyst?
10. Describe the hydrocracking process? What is the advantage of hydrocracking over FCC?
11. Describe the various type catalytic reforming reactors? Describe the catalytic reforming process? What are the various reactions involved in catalytic reforming?
12. Describe the isomerisation process of low grade naphtha for improving octane number?
13. What are the various residue upgradation technologies?
14. Describe the Delayed coking and Visbreaking process?
15. What are the bio fuel?
16. What is the concept of Petrochemical refinery?
17. Describe the various desulphurization processes in petroleum refinery? How sulphur is recovered from H₂S?

DIFFERENTIATE BETWEEN

1. Short term and Long term evaluation
2. RON and MON
3. Density and API gravity
4. Flash point and Fire point

5. Metal function and acid Function catalyst
6. Octane number and Cetane number
7. Visbreaking and Delayed cooking
8. Fluid coking and Flexi coking
9. Cloud point and Pour point
10. Catalytic reforming and Steam reforming
11. Characteristion factor and BMCI index
12. Liquid hourly space velocity(LHSV) and Weight hourly space velocity(WHSV)
13. Selectivity and Activity of catalyst
14. Thermal cracking and Catalytic cracking
15. Clauss process and Modified Clauss Process
16. Temporary poisons and Permanent poisons in catalyst
17. Acid function and Metal function catalyst
18. Penex TM and Par Isom TM process
19. Straight run naphtha and cracked naphtha
20. Light cycle oil and heavy cycle oil

VII. MODULE VII – PETROCHEMICAL

DESCRIPTIVE QUESTIONS

1. Describe the various parameters for evaluation of feed stock for Olefin, aromatic and linear alkyl benzene?
2. Describe the importance of natural as petrochemical feed stock?
3. What are the oxygenates? Describe the manufacture of MTBE and TAME?
4. Describe the manufacture of terephthalic acid?
5. Describe the manufacture of methanol? What are the various uses of methanol? What is the methanol to olefin technology?
6. Describe the methanol to olefin and dehydrogenation of paraffins for production of olefins?
7. Describe various routes for making caprolactam?

8. Describe the various aromatic conversion processes?
9. Describe the cyclizer process for the manufacture of aromatics?
10. What are the various petrochemicals derived from FCC and cracker gas stream?
11. Describe the various steps involved in recover of C4 and C5 chemicals from a cracker plant?
12. What are the various sources of butadiene? How butadiene is recovered from naphtha cracker gases?
13. Describe the process of p-xylene manufacture using naphtha as feed stock?
14. What are the various routes for making ethylene oxide? Describe with flow diagram the manufacture of ethylene oxide. What are process hazards associate in ethylene oxide manufacture?
15. Describe with flow diagram the manufacture of olefins using Naphtha/natural gas as feed stock?
16. What are the various parameters affecting the production of ethylene and propylene in naphtha cracker? How the severity affects the production of olefins?
17. What is the purpose of decoking and how it affects the performance of Furnace? What are the various methods used for decoking?
18. Describe the process of dearomatizing of aromatic rich naphtha?
19. Describe the various technological development in naphtha cracker plant for production of olefin?
20. Describe the various routes for acrylonitrile manufacture. Describe the process of acrylonitrile manufacture?
21. What are various routes for manufacture of vinyl chloride? Describe the oxychlorination process for the manufacture of vinyl chloride. What is advantage of oxychlorination process over the chlorination process?
22. What are the various uses of Phenol? Describe the cumene process for the manufacture of phenol?
23. What are the various uses of Ethylene? Describe the manufacture of ethylene oxide and ethylene glycols?
24. What are the various sources of ethylene and propylene? Describe the role of olefins in development of chemical industry?

DIFFERENTIATE BETWEEN

1. Run length and Decoking
2. Cyclic and Moving bed reactor
3. Toluene Disproportionation and Hydrodealkylation
4. Oxidative coupling and Cyclar process
5. Chlorination and Oxychlorination process of vinyl chloride
6. Dearomatisation and Aromatisation
7. Olex and Molex process
8. Gasoline and Pyrolysis gasoline
9. Low pressure and High pressure process of methanol

VIII. MODULE VIII - POLYMER, ELASTOMERS, SYNTHETIC FIBRE

DESCRIPTIVE QUESTIONS

1. Describe the classification of Polymers? What are the various polymerization processes?
2. What are various raw materials for synthetic fibre industry? Describe the classification of manmade fibre?
3. What are the various routes for manufacture of terephthalic acid? What is the advantage of terephthalic acid (TPA) over dimethyl terephthalate (DMT)?
4. What are the two commercial methods used for the manufacture of terephthalic acid? Describe the manufacture of terephthalic acid?
5. Describe the manufacture of following
 - a. Polyethylene,
 - b. Poly propylene
 - c. Polyvinal chloride
 - d. Polyester
 - e. Acrylic fibre

- f. Nylon 66
 - g. Nylon 6
6. What are various raw materials for synthetic fibre industry? Describe the classification of manmade fibre? What are the various synthetic fibres manufactured in India?
 7. What are the various sources of natural celluloses?
 8. What are various raw materials for viscose rayon? Describe the manufacture of viscose rayon from cellulose derived from rayon grade pulp?
 9. Describe the manufacture of acetate rayon?
 10. What are raw materials for synthetic rubber industry? Describe the manufacture of Styrene and butadiene rubber (SBR)?
 11. What are the various routes for the manufacture of caprolactam? Describe the manufacture of caprolactam?
 12. What are the various routes for acrylonitrile manufacture? Describe the manufacture of acrylonitrile using propylene and ammonia?
 13. Describe the various types of synthetic rubber manufacture in India? What are the various raw materials for synthetic rubber industry?
 14. What are the various thermo set and thermoplastic resins? Describe the various raw materials for polyolefins?
 15. Describe the manufacture of nitrile rubber? What are the advantage of nitrile rubber?

DIFFERENTIATE BETWEEN

1. Addition polymerization and Condensation polymerisation
2. Thermoset and Thermoplastic resins
3. Dry spinning and Melt spinning
4. Random copolymer, Alternating copolymer, Block copolymer
5. Bulk suspension and Emulsion polymerisation
6. Plasticisers, Blowing agent and Cross linking agents
7. Commodity plastics and Engineering plastics
8. Oligmerisation and Polymerisation
9. Polymer and Elastomers

10. Dry spinning and Wet spinning
11. Viscose rayon and Acetate rayon
12. Paper grade pulp and Rayon grade pulp
13. Natural rubber and Synthetic rubber
14. Conventional and Greener caprolactam process
15. Staple fibre and Filament yarn
16. Spinning and Crimping
17. Spinning and Twisting
18. Aging and Ripening
19. Steeping and Shredding
20. General Purpose and Special Purpose Rubber

IX. MODULE IX - DYES AND PESTICIDES

DESCRIPTIVE QUESTIONS

1. Discuss the status of Pesticide industry in India? What are the various pesticide manufactured in India?
2. Give the classification of pesticides?
3. What are the biopesticides? What are the advantages of biopesticides?
4. Describe the various types of dyes? What are the various chromophore of various types of dyes?
5. What are the various raw materials for dye and intermediate? Describe the various intermediates for manufacture of dyes?

DIFFERENTIATE BETWEEN

1. Azo dye and Reactive Dye
2. Vat dyes and Sulphur dyes
3. Herbicide and Fungicide
4. Insecticide and Miticide
5. Acid dyes and Basic dyes

1. Answers to Multiple Choice question

- 1) d 2) b 3) a 4) c 5) d 6) a 7) a 8) 9) d 10) b
11) a 12) c 13) d 14) b 15) b 16) a 17) a-f b-e c-h d-g 18) c 19) a 20) c
21) d 22) c 23) c 24) b 25) c 26) c 27) c 28) c 29) b 30) b
31) d 32) c 33) d 34) d 35) d 36) b 37) d 38) d 39) d 40) a
41) d 42) a 43) c 44) b 45) b 46) d 47) 48) a 49) b 50) c
51) a 52) c 53) a 54) a 55) d 56) c 57) d 58) c 59) d 60) c
61) a 62) a 63) b 64) a 65) b 66) c 67) a 68) a 69) a 70) a
71) b 72) a-c, b-d, c-b, d-b 73) b 74) d 75) d 76) b 77) a 78) c 79) c 80) a
81) d 82) d 83) a 84) a-h, b-e, c-f, d-g 85) c 86) a 87) a 88) c 89) d 90) c
91) d 92) c 93) d 94) d 95) a 96) a 97) b 98) a 99) c 100) b

2. Answers to Fill in the banks

1. higher
2. higher
3. lower aromatic
4. lower
5. 3.5
6. Buero of Mines Correlation Index
7. Paraffinic
8. 40
9. Higher
10. more smoke
11. methane
12. aromatics and cyclic paraffin
13. linear alkyl benzene
14. more
15. paraffinic
16. that the fuel is Paraffinic and hence has a high diesel index
17. propylene and ammonia
18. higher
19. Melt spinning
20. GSFC and FACT
21. Benzene

22. p-xylene
23. reaction of adipic acid and hexamethylene diamine
24. Dry, Wet, Melt
25. Acrylic fibre
26. benzene, toluene, ammonia, sulphuric acid
27. DMT
28. ethylene/ ethylene oxide

29. caprolactam

30. melt spinning
31. acetonitrile
32. ammonium sulphate
33. caprolactam
34. Wool
35. p-xylene
36. low
37. propane
38. to improve octane number and reduction of CO
39. diesel index
40. Adsorption
41. adipic acid and hexamethylene diamine
42. lower
43. true boiling point
44. high acid and heavy sourcudes
45. sulphur and nitrogenous compounds
46. FCC
47. higher melting point
48. anthracite coal
49. coal bed methane
50. moisture, ash, fixed carbon. Volatile matter
51. CO and H₂
52. coke oven gas
53. Propane and butane from natural gas
54. to increase resistance towards penetration of water, avoid feathering of ink
55. NaOH
56. Mechanical pulp
57. bake litet
58. reduce emission of sulphur compounds
59. to convert sodium carbonate to sodium hydroxide and white liquor
60. strength
61. sodium sulphate
62. backward feed is used
63. propylene yield
64. higher ethylene

65. **diphenyl dichloro trichloethane**
66. **Insect Growth Regulators**
67. acid catalyzed rearrangement of an oxime to an amide
- 68.
69. conversion of primary amide into a primary amine with one fewer carbon atom
70. synthesis of alkanes
71. mixed acid
72. the introduction of sulphonic acid group or corresponding salt like sulphonyl halide into a organic compound
73. introduction of $-\text{OSO}_2\text{OH}$ or $-\text{SO}_4^-$.
74. Para cresol or meta cresol isomers
75. Para cymene or meta cymene from cymene isomers
76. $\text{CaC}_2 \rightarrow \text{Acetylene} \rightarrow \text{VCM} \rightarrow \text{PVC}$
77. Molasses \rightarrow Alcohol \rightarrow $\text{C}_2\text{H}_4 \rightarrow$ EDC \rightarrow VCM \rightarrow PVC
78. Bisphenol + phosgene \rightarrow Polycarbonate
79. bisphenol and epichlorohydrin
80. during separation of alcohol during distillation of fermented molasses
81. dehydration
82. melamine formaldehyde
83. 0.5ppm
84. lower
85. hydrogenation and dehydrogenation reaction
86. toluene, benzene and xylene
87. wax
88. chlorine, chlorine dioxide, ozone, hydrogen peroxide, calcium hypochlorite
89. 0.7625
90. 110°C
91. octane Number
92. isobutylene and methanol
93. alum, rosin
94. $-\text{N}=\text{N}-$
95. amino and substituted amino compounds
96. anthraquinone and indanthrene
97. herbicides
98. trichogramma, Fungi (Trichoderma and Gliocladium), Baculovirus, Bacillus thuringiensis
99. C10-13
100. petroleum

3. Answers to Descriptive Question is in Various Modules Lectures

4. Answer to Question on “Differentiate Between” is in Various Modules Lectures.

