

Syllabus for III B.Sc., Petroleum & Petrochemicals

Semester - VI

Paper – VII: Petrochemicals -II (Elective)

Unit 1: Chemicals from Methane (C₁ Compounds).

Production of Methanol, Fluorochloromethanes, Hydrogen Cyanide and Methylamine from Methane.

Production of Formaldehyde, Tertiary Amyl Methyl Ether (TAME), Dimethyl formamide from Methanol.

Production of Hexamethylene Tetramine and Ethylene Glycol from formaldehyde.

Unit 2: Chemicals from Ethylene (C₂ compounds)

Production of Ethylene by Naphtha cracking – manufacture of vinyl chloride, vinyl Acetate, Ethanol, Acetaldehyde, Ethylene oxide, Ethylene glycols from Ethylene –

Unit 3: Chemicals from propylene (C₃ compounds) Production of Propylene by catalytic cracking of Petroleum distillate - Production of Isopropyl Alcohol, Propylene oxide, Acrylonitrile, Acrolein, Acrylic Acid and Epichlorohydrin from Propylene.

Unit 4: Chemicals from Butylene, Butadiene and pentanes. (C₄ and C₅ compounds)

Dehydrogenation of Butanes for the Production of Butenes and Butadiene – catalytic dehydrogenation of butanes for the production of Butadiene – Production of methacrylic acid, MTBE from Butenes.

Production of Adipic acid from Butadiene – production of Isoprene from methyl butenes (C₅ feed).

Unit 5- : Petroleum Aromatics and its chemicals:

Production of BTX through catalytic reforming, Reformate separation into Aromatics (Unidex process), BTX separation from crude BTX Disproportionation of Toluene into Benzene and Xylenes, Isomerization of Xylenes to p-Xylene.

Chemicals from BTX Aromatics - Styrene from Benzene, Caprolactam and Toluene Diisocyanate from Toluene, Dimethyl Terephthalate from p-xylene.

Suggested Reading:

- 1) A Text on Petrochemicals by Dr. B.K. Bhaskara Rao Khanna Publishers, Delhi.
- 2) Petrochemicals process Technology by ID Mall Macmillan India Ltd.,
- 3) Introduction to Petrochemicals by Sukumar Maiti Oxford IBH.

III B.Sc., Petroleum & Petrochemicals
MODEL QUESTION PAPER
Paper –VII: Petrochemicals – II (ELECTIVE)

Time: 2¹/₂ Hrs.

Semester - VI

Max. Marks 60

Section-I

Answer any Three questions.
All questions carry equal marks.

3 x 16 = 48 Marks

1. a. With a neat flow chart, describe the process of manufacturing of methanol from methane.
 b. With a neat flow chart, describe the process of manufacturing formaldehyde from methanol.
2. a. Explain about the production of Ethylene by steam cracking of Naphtha.
 b. With a neat flow diagram describe the process of production of Ethylene Oxide from ethylene.
3. a. with a neat flow chart explain the process of production of Propylene by catalytic cracking of petroleum Distillate.
 b. With a neat flow diagram describe the process of production of Acrylonitrile from Propylene.
4. a. With a neat flow diagram describe the process of catalytic dehydrogenation of Butenes for the production of Butadiene.
 b. Explain the production of MTBE with a neat flow chart.
5. a. With a neat flow chart describe the Udex process for Aromatics Separation from Reformate.
 b. With a neat flow diagram, describe the process of isomerization of Xylenes to p-Xylene.

Section II

Write short notes on ANY FOUR of the following:

4x3=12 Marks

6. Production of Methylamines from Methane.
7. Production of Ethylene glycol from Ethylene.
8. Epichlorohydrin from propylene.
9. Production of Adipic acid from Butadiene.
10. Production of DMT from Paraxylene.

Note to paper setter:

In Section I, one essay questions is to be set from each of the 5 units.

Similarly, in section II, one short answer question is to be set from each of the 5 units.

III B.Sc., - Petroleum & Petrochemicals
Paper –VII: SEMESTER - VI
PETROCHEMICALS – II (Elective)
QUESTION BANK

Essay Questions: 16 M

UNIT –I:

1. a. With a neat flow chart, describe the process of manufacturing of methanol from Methane.
b. With a neat flow chart, describe the process of manufacturing of HCN from Methane.
2. a. With a neat flow chart, describe the process of manufacturing of formaldehyde from methanol.
b. With a neat flow chart, describe the process of manufacturing Di methyl Formaldehyde (DMF) from methanol.
3. a. With a neat flow chart, describe the process of manufacturing of Tertiary Amyl Methyl Ether (TAME) from methanol.
b. With a neat flow chart, describe the process of manufacturing Glycol from formaldehyde.

UNIT –II:

1. a. Explain about the production of Ethylene by steam cracking of Naphtha.
b. With a neat flow diagram describe the manufacture of vinyl chloride from ethylene.
2. a. With a neat flow diagram describe the manufacture of vinyl acetate from Ethylene.
b. With a neat flow diagram describe the manufacture of Ethyl alcohol from Ethylene.
3. a. With a neat flow diagram describe the process of production of Ethylene Oxide from ethylene.
b. With a neat flow diagram describe the process of production of Acetaldehyde from ethylene.

UNIT –III:

1. a. With a neat flow chart explain the process of production of Propylene by catalytic cracking of petroleum Distillate.
b. With a neat flow chart explain the process of production of Isopropyl alcohol from propylene.

2. a. With a neat flow chart explain the process of production of Propylene oxide from propylene.
b. With a neat flow diagram describe the process of production of Acrylonitrile from Propylene.

UNIT –IV:

1. a. With a neat flow diagram describe the process of catalytic dehydrogenation of Butenes for the production of Butadiene.
b. With a neat flow diagram describe the process of production of methacrylic acid from Isobutylene
2. a. Explain the production of MTBE with a neat flow chart from Isobutene
b. With a neat flow diagram describe the process of production of Maleic anhydride from C₄ unsaturates.
3. a. With a neat flow diagram describe the process of production of Isoprene from methyl butenes
b. With a neat flow diagram describe the process of production of adipic acid from Buta diene.

UNIT –V:

1. a. With a neat flow chart describe the Udex process for Aromatics Separation from Reformate.
b. With a neat flow diagram describe the process of production of BTX aromatics by catalytic reforming of Naphtha
2. a. With a neat flow diagram describe the process of disproportionation of toluene into Benzene and Xylenes.
b. With a neat flow diagram describe the process of isomerization of xylene to p-xylene..
3. a. With a neat flow diagram describe the process of production of styrene from benzene.
b. With a neat flow diagram describe the process of production of

Short answer questions: 03 M

UNIT - I:

1. Explain about the production of ethyl amine from methane
2. Write about the production of Fluoro – chloro methane's from methane
3. Write about the production of hexa methylene tetramine
4. Write about the production of Dimethyl formamide from Methanol.

UNIT - II:

1. Production of Ethylene glycol from Ethylene
2. Production of acetaldehyde from Ethylene

UNIT - III:

1. Production of Epichlorohydrin from propylene
2. Production of Acrolein from propylene

UNIT - IV:

1. Production of Adipic acid from Butadiene.
2. Conversion of Butanes to Butenes
3. Manufacture of Butadiene from Butanes

UNIT - V:

1. Production of DMT from Paraxylene.
2. Reformate separation into aromatics
3. Toluene di isocyanate from toluene

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units. Similarly in

Section - II, one short answer question is to be set from each of the five units. Questions should be given from QUESTION BANK.

III B.Sc., Petroleum & Petrochemicals
Paper –VIII: **Petrochemicals – III (Cluster -I)**

Time: 2½ Hrs.

Semester - VI

Max. Marks 60

Unit 1: Petroleum Coke and Carbon Black

Petroleum Coke - methods of production - Delayed coking, fluid coking, contact coking, Manufacture of carbon electrodes.

Carbon Black: Methane decomposition - Wulff's process Manufacture of Carbon Black by Phillips Furnace process - Activated Carbon and its applications.

Unit 2: Coal and its Chemicals:

Formation of coal and its properties carbonization - Low Temperature Carbonization (LTC) and High Temperature Carbonization (ATC) - Processing of Carbonization Products (Coke-oven gas processing), Fractional Distillation of coal Tar, Gasification of coal, Liquefaction of coal.

Synthetic Fuels from Coal - Berzius Process and Fischer Tropsch process.

Unit 3: Cellulose Plastics:

Manufacture of Cellulose Nitrate and Cellulose Acetate - Manufacture of Rayon by Vizcose Process and Cuprammonium Process, Manufacture of Cellulose Acetate Butyrate (Cab), Ethyl Cellulose and Carboxy Methyl Cellulose (CMC).

Unit 4: Miscellaneous Petrochemicals:

- a. Resin and Rubber Chemicals - stabilizers, Antioxidants, Accelerators, Plasticizers
- b. Pesticides from Petroleum: DDT, BHC, 2, 4-D, Captan, Malathion, Parathion.
- c. Organic Dyes: Azo dye, Orange-II, Congo Red, Anthraquinone dye, Indigo, Fluorescein and Malachite green.
- d. Explosives: TNT, Tetryl, RDX, HMX, Dynamite, PETN.
- e. Petroleum Protein.

Unit 5: Corrosion and Material of construction in Petroleum and petrochemical Industries

Fundamentals of corrosion - classification of corrosion-Types of Corrosion - Factors affecting corrosion - corrosion in Pipelines.

Corrosion Prevention and control - Selecting Corrosion Resistant Material of Construction - Corrosion Inhibitors - Use of Inhibitors in Petroleum and Petrochemicals Industries - Isolation of material from the Corrosive Atmosphere - coating.

Suggested Reading.

- 1) A Text on Petrochemicals by Dr. B.K. Bhaskara Rao, Khanna Publishers.
- 2) Fuels and petrochemical processing by B.K. Sharma Goel Publishing House Meerut.
- 3) Dryden's Out lines of Chemical Technology by M. Gopala Rao and Marshall sitting East – West Press.
- 4) Introduction to petrochemicals by Sukumar Maiti Oxford & IBH Publishing Co. Pvt. Ltd.,
- 5) Outlines of Polymer Technology – Manufacture of Polymers by R. Sinha Prentice Hall of India Private Ltd.

III B.Sc., Petroleum & Petrochemicals
MODEL QUESTION PAPER
Paper - VIII: Petrochemicals – III (Cluster -I)

Time: 2¹/₂ Hrs.

Semester - VI

Max. Marks 60

Section-I

Answer any three questions from the following.

All questions carry equal volumes

3 x 16 = 48 Marks

- 1) a) With the help of a flow diagram describe the process of production of coke by Delayed coking Technology.
b) Describe the process of production of carbon black by Phillips oil furnace process with a neat flow diagram.
- 2) a) What is carbonization? Describe the High Temperature carbonization process.
b) With a neat diagram, describe the process of coal gasification.
- 3) a) With a neat flow chart describe the process of manufacturing Rayon by Viscose Process.
b) With a neat flow chart describe the process of production of cellulose Acetate Butyrate.
- 4) a) Describe how Parathion is manufactured with the help of a flow sheet.
b) Write briefly about classification of explosives. Write briefly about the production of the following explosives.
(i) TNT (ii) RDX iii) Dynamite
- 5) a) Write an essay on the corrosion in Petroleum and Petrochemicals Industries.
b) Write detailed notes on the use of Corrosion Inhibitors in Petroleum and Petrochemical Industries.

Section - II

Write short notes on any FOUR of the following

4 x 3 = 12 Marks

- 6) Manufacture of Carbon Electrodes
- 7) Berzius Process
- 8) Cellulose Nitrate
- 9) Petroleum Protein
- 10) External Pipeline Corrosion.

Note to paper setter:

In Section I one essay question is to be set from each of the Five (5) units.

Similarly in Section II one short answer question is to be set from each of the Five (5) units.

III B.Sc., - Petroleum & Petrochemicals
SEMESTER - VI
Paper – VIII: PETROCHEMICALS – III (CLUSTER - 1)
QUESTION BANK

Essay Questions: 16 M

Unit – I:

1. a. With a neat flow diagram describe the manufacturing method of Petroleum coke by delayed coking unit.
b. With a neat flow diagram describe the process of production of petroleum coke by fluid coking method.
2. a. With the help of a flow diagram describe the process of production of petroleum coke by continuous contact coking
b. With a neat flow diagram describe the process of production of carbon black by Philips furnace process.

Unit – II:

1. a. What is Carbonization ? Describe the process of low temperature carbonization
b. With a neat flow diagram describe the processing of gasification of coal
2. a. What is Carbonization? Describe the process of high temperature carbonization
b. With a neat flow diagram explain the products that can be obtained by fractional distillation of coal tar

Unit – III:

1. a. With a neat flow diagram describe the conventional process of manufacturing of cellulose acetate
b. With a neat flow chart describe the process of manufacturing of Rayon by viscose process
2. a. With a neat flow diagram describe the manufacturing process of Rayon by Cuprammonium process
b. With a neat flow diagram describe the manufacturing process of cellulose acetate butyrate
3. a. With a neat flow diagram describe the process of manufacturing of cellulose nitrate
b. With a neat flow diagram describe the process of manufacturing of Carboxy methyl cellulose

Unit – IV:

1. a. With a neat flow diagram describe the manufacturing process of DDT
b. With a neat flow diagram describe the manufacturing process of 2,4 - D
2. a. With a neat flow diagram describe the manufacturing process of Parathion
b. Describe the manufacturing process of production of important dyes

3. a. Write briefly about the production of the following explosives.
i. TNT (ii) RDX iii) Dynamite
b. Write in detail about petroleum protein

Unit – V:

1. a. Write an essay on various types of corrosion
b. Write in detail about corrosion in petroleum and petrochemicals
2. a. Write an essay on corrosion in pipe lines
b. Write detailed note on isolation of material from the corrosive atmosphere

Short answer questions: 03 M

Unit – I:

1. Manufacture of carbon electrodes
2. Manufacture of carbon black by methane decomposition
3. Wulfs process for the production of carbon black
4. Applications of activated carbon

Unit – II:

1. Different grades of coal
2. Calorific value
3. Liquefaction of coal
4. Berzius process
5. Fischer tropesch process

Unit – III:

1. Sources and structure of Cellulose
2. Manufacturing process of Ethyl Cellulose
3. Manufacturing of Carboxy methyl cellulose

Unit – IV:

1. Manufacturing process for BHC
2. Manufacturing process for Malathion
3. Manufacturing of captain
4. Preparation of TNT and Dynamite

Unit – V:

1. Classification of corrosion
2. Factors affecting corrosion
3. Corrosion inhibitors.

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units. Similarly
in

Section - II, one short answer question is to be set from each of the five units.
Questions should be given from QUESTION BANK.

III B.Sc., - Petroleum & Petrochemicals

Semester - VI

Paper –IX: Manufacturing Processes of Polymers (Cluster -II)

- Unit – 1: Polymers of Olefins:
Polymers of Ethylene: High Pressure Polyethylene (LDPE) – conventional and slurry processes, Low pressure Poly Ethylene (HDPE) – Zeigler process and Solvay process.
Polymers of Propylene – different forms of polypropylene – manufacture of Isotactic polypropylene.
- Unit – 2: Polymers of Olefins:
Poly Vinyl Chloride: Manufacture of PVC by suspension polymerization process and emulsion polymerization process.
Polystyrene: Manufacture of Polystyrene by mass polymerization and emulsion polymerization.

Manufacture of Polybutadiene and Poly Tetrafluoro ethylene (PTFE)
- Unit – 3: Synthetic Fibres:
Polysters – Saturated and unsaturated – Manufacture of Polyester from DMT and TPA,
Manufacture of Polycarbonate polymers
Nylons: Manufacture of Nylon – 6, Nylon – 6, 6, Nylon -7
Acrylic Fibres: Production of Poly acrylo Nitrile, & Poly methyl methacrylate (PMMA)
- Unit – 4: Synthetic Rubbers:
Manufacture of Styrene – Butadiene Rubber, Acrylonitrile – Butadiene Rubber (Nitrile Rubber), Butyl Rubber, Manufacture of Urethane Rubber, silicone rubber, polysulphide rubbers.
- Unit – 5: Plastics:
Engineering plastics – Phenol – Formaldehyde resins, Production of Novolac and Resol resins, manufacture of Urea – Formaldehyde and Melamine – Formaldehyde Resins, Epoxy – resins and ABS Plastics.

Suggested Reading.

- 1) A Text on Petrochemicals by Dr. B.K. Bhaskara Rao, Khanna Publishers.
- 2) Petrochemical process Technology by I.D. Mall Macmillan India Ltd.,
- 3) Dryden's Out lines of Chemical Technology by M. Gopala Rao and Marshall sitting East – West Press.
- 4) Introduction to petrochemicals by Sukumar Maiti Oxford & IBH Publishing Co. Pvt. Ltd.,
- 5) Outlines of Polymer Technology – Manufacture of Polymers by R. Sinha Prentice Hall of India Private Ltd.

MODEL QUESTION PAPER

Paper IX – Manufacturing Processes of Polymers (Cluster - II)

Time: 2¹/₂ Hrs.

Semester - VI

Max. Marks 60

Section - I

Answer any Three questions from the following

All questions carry equal marks.

3x16=48 Marks

1. a. With a neat flow diagram describe the process of Production of HDPE by Zeigler process.
 b. With a neat flow diagram describe the process of production of Isotactic polypropylene
2. a. With a neat flow diagram describe the production of Polyvinyl chloride by emulsion polymerization.
 b. With a neat flow diagram describe the process of production of Polybutadiene.
3. a. With a neat flow diagram describe how polyester ribbon is produced from Terephthalic Acid.
 b. With a neat flow diagram describe the process of Production of Nylon-6.
4. a. With a neat flow diagram describe the process of Production of Nitrile Rubber.
 b. With a neat flow diagram describe the process of Production of silicone oils via direct monomer process.
- 5) a. With a neat flow diagram describe the process of Production of Resol Resin.
 b. With a neat flow diagram describe the process of Production of ABS plastics.

Section – II

Write short notes on ANY FOUR of the following.

4x3=12 Marks

6. LDPE
7. Poly Tetrafluoroethylene (PTFE)
8. Enant Fibres
9. Poly Sulphide Rubber.
10. U-F Resins

Note to proper setter:

In section I, one essay question is to be set from each of the 5 units. Similarly in section II, one short Answer question is to be set from each of the 5 units.

III B.Sc., - Petroleum & Petrochemicals
Semester - VI

Paper –IX: **Manufacturing Processes of Polymers (Cluster -II)**

Question Bank

Unit –I:

1. a. With a neat flow diagram describe the manufacturing of LDPE by conventional process
b. With a neat flow diagram describe the manufacturing of LDPE by slurry process
2. a. With a neat flow diagram describe the manufacturing of HDPE by Ziegler process
b. With a neat flow diagram describe the manufacturing of HDPE by Solvay process.

Unit-II:

1. a. With a neat flow diagram describe the manufacturing of Poly vinyl chloride by suspension process
b. With a neat flow diagram describe the manufacturing of Poly vinyl chloride by emulsion polymerization process
2. a. With a neat flow diagram describe the manufacturing of poly styrene by bulk polymerization process
b. With a neat flow diagram describe the manufacturing of poly styrene by emulsion polymerization process

Unit -III:

1. a. With a neat flow diagram describe the manufacturing of polyethylene terephthalate from terephthalic acid
b. With a neat flow diagram describe the manufacturing of polyester filaments from dimethyl terephthalic
2. a. With a neat flow diagram describe the manufacturing of poly carbonate polymer
b. With a neat flow diagram describe the manufacturing of Nylon -6,6

Unit -IV:

1. a. With a neat flow diagram describe about the production of polystyrene butadiene rubber
b. With a neat flow diagram describe the manufacturing of acrylonitrile butadiene rubber
2. a. With a neat flow diagram describe the manufacturing of butyl rubber
b. With a neat flow diagram describe the manufacturing of silicone polymers by Grignard process

Unit -V:

1. a. With a neat flow diagram describe the manufacturing of Novolac resins
b. With a neat flow diagram describe the manufacturing of Urea formaldehyde resins
2. a. With a neat flow diagram describe the manufacturing process of melamine formaldehyde resins
b. With a neat flow diagram describe the manufacturing process of Epoxy resins

Short answer Questions: 03 M

Unit – I

1. Manufacturing of isotactic poly propylene
2. Ziegler Natta catalyst
3. Different types of poly propylene

Unit – II

1. Manufacturing of poly butadiene
2. Manufacturing of tetrafluoro ethylene

Unit – III

1. Saturated and unsaturated polyesters
2. Nylon -6
3. Nylon-7
4. Poly acrylic nitrile

Unit – IV

1. Vulcanization process
2. Urethane rubber
3. Poly sulphide rubbers

Unit - V

1. ABS plastics
2. Resol resins
3. Preparation of melamine

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units. Similarly
in

Section - II, one short answer question is to be set from each of the five units.
Questions should be given from QUESTION BANK.

III B.Sc., - (Petroleum & Petrochemicals)

Semester - VI

Paper –X: Testing and processing Techniques of Polymers (Cluster - III)

Unit – 1: Testing of Polymers:-

Plastics and their appearance – Preliminary Tests, Solubility and Density, Behaviour on Heating, Glass Transition Temperature and its determination,

Testing for Heteroatoms – Lassaigne method, Formaldehyde test.. General Identification Reactions: Libermann – Storch – morawski Reaction, Colour reaction with p-dimethyl amino benzaldehyde, Gibbs Indophenol test, Formaldehyde test.

Specific Identification Tests for the following Polymers – Polyolefins, Polystyrene, Polyamides, Polyesters, Resins.

Unit – 2: Extrusion Moulding:

Different elements and functions of a typical Extruder Screw, Screw zones and Screen Packs, Flat – film extruder, Sheet Extruder – problems of extruding ..

Unit – 3: Compression Moulding:

Types of Compression Moulds – Flash, Semipositive, Positive and Landed Positive – Down Stroking Compression Molding process – Side Ram type compression Moulding process and rotary press - cold moulding - Cooling Fixtures and shrink blocks.

Unit – 4: Transfer Moulding:

Transfer Moulding and its functioning – Equipment required for Transfer Moulding process – Plunger type Transfer Mould – Screw Transfer Mould assemblies – Runners, Gates and vents – Role of pressure in a Transfer Moulding system -.

Unit – 5: Blow Moulding, and finishing operations:

Blow Moulding – Blow – die forming, Injection Blow Moulding, Continuous Extrusion Blow Moulding, Intermittent extrusion Blow Moulding.

Finishing Operations: Filing, Scraping, Tumbling, Grinding and Sanding, Ashing and Buffing – Polishing of Polymeric Material.

Suggested Reading:

- 1) Simple Methods of Identification of Plastics – by Dietrich Braun.

Carl Hanser Verlag Munich – Germany.

- 2) Outlines of Polymer Technology.

Processing polymers by R. Sinha, Prentice Hall of India Pvt. Ltd., New Delhi

MODEL QUESTION PAPER

Paper –X: Testing and Processing Techniques of Polymers (Cluster III)

Time: 2 1/2 Hrs.

Semester - VI

Max. Marks 60

Section - I

Answer any Three questions from the following

All questions carry equal marks.

3x16=48 Marks

1. a. What are thermosets and thermoplasts?
Write briefly about solubility tests for some important polymers.
- b. Write specific Identification tests for the following plastics.
i) Polyolefins ii) Polyamides
2. a. Define extrusion. Write short notes on.
i) screw zones ii) Screen packs
- b. With the help of neat sketch, describe the working of flat film extruder.
3. a. Explain the significance of the following two types of compression moulds.
i) Positive type mould ii) Landed positive type mould
- b. With the help of a neat sketch, discuss the side-ram type of compression moulding process.
4. a. Define Transfer moulding.
With a neat sketch, describe the plunger type transfer mould technique.
- b. With the help of a neat sketch, explain the working of a typical screw transfer moulding press.
5. a. With a neat sketch describe the technique of Intermittent extrusion blow moulding.
- b. Write in briefly about some of the important finishing operations.

Section II

Write short notes on ANY FIVE of the following.

5x2=10 Marks

6. Gibbs Indophenol Test
7. Explain problems of extruding
8. What is cold moulding? Give examples.
9. Explain briefly about the Runners and Gates that are used in Transfer moulding.
10. Write short notes on blow die forming

Note to paper setter:

In section I, one essay question is to be set from each of the 5 units.

Similarly in question II, one short answer question is to be set from each of the 5 units.

QUESTION BANK

Essay Questions: 16 M

Unit – I:

1. a. Write an essay on the analysis procedure of plastics
b. Explain about the experimental determination of glass transition temperature
2. a. Write about the experimental details of testing of hetero atoms present in plastics
b. Write in detail about the following,
 - i. Liebermann - storch-morawski reaction
 - ii. Color reaction with p- dimethyl amino benzaldehyde
 - iii. The Gibbs indophenol test

Unit -II:

1. a. With a neat sketch explain about the different elements and their functions of typical extruder
b. With a neat sketch describe the working of a flat film extruder using a quench tank
2. a. With a neat sketch describe the working of a flat film extruder using a chilling roll
b. Describe the manufacturing process of polymer sheets and how they are different from polymer films?

Unit -III:

1. a. Describe in detail about the flash type of compression moulding technique
b. With a neat sketch describe about the semi positive compression moulding technique
2. a. Explain about the design details of the mould and also explain the significance of positive type compression mould and Landed positive type compression mould
b. With a neat sketch explain about the complete cycle of operation of a down stroking compression moulding press.

Unit -IV:

1. a. With a neat sketch explain about the commercially used true transfer moulding
b. With a neat sketch describe about the plunger type transfer moulding
2. a. With a neat sketch explain in detail about the screw transfer moulding process
b. Explain in detail about the different types of pressures in a transfer moulding system

Unit -V:

1. a. With the neat sketches explain about the techniques of continuous extrusion blow moulding
b. With the neat sketches explain about the techniques of intermittent extrusion blow moulding

2. a. With a neat sketch explain about the following,
 - i. Blow die forming of thermoplastic sheets
 - ii. Blow moulding a hollow sphere with sheets
 - iii. Blow moulding with softened tubular thermoplastic
- b. With a neat sketch explain about the injection blow moulding

Short answer Questions: 03 M

Unit – I:

1. Types of Plastics
2. Solubility of plastics
3. Formaldehyde test
4. Specific identification tests for poly olefins and poly styrene
5. Poly amides and poly esters

Unit – II:

1. Screw with a disrupter
2. Screw Zones
3. Screen packs
4. Die swell

Unit – III:

1. Cooling fixtures
2. Shrink blocks
3. Cold moulding
4. Compression moulding with rotary press

Unit – IV:

1. Runners in a transfer mould
2. Gates in a transfer mould
3. Vents in a transfer mould
4. Equipment required for a transfer moulding process

Unit – V:

1. Polishing of polymer material
2. Tumbling
3. Grinding and sanding
4. Ashing and Buffing.

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units. Similarly in

Section - II, one short answer question is to be set from each of the five units. Questions should be given from QUESTION BANK.

III B.Sc., - (Petroleum & Petrochemicals)

Practical Syllabus

Semester - VI

PRACTICAL – VII : (At the end of Sixth Semester)

- 1) Preparation of Fluorescein Dye.
- 2) Preparation of Azo Dye.
- 3) Preparation of Novolac resin.
- 4) Preparation of Resol Resin.

PRACTICAL VIII (At the End of Sixth Semester)

- 1) Preparation of Urea – Formaldehyde resin.
- 2) Preparation of Cold Cream.
- 3) Preparation of Terephthalic Acid.
- 4) Preparation of Dimethyl Terephthalate.

PRACTICAL IX (At the end of sixth semester)

- 1) Adsorption of Oxalic Acid on Silica gel – Study of validity of Freundlich Adsorption Isotherm.
- 2) Determination of viscosity of polymer solutions by using Ostwald viscometer.
- 3) Sedimentation
- 4) Determination of Heat of Solution

SCHEME OF VALUATION

Max. Marks: 35

- | | |
|--|----------|
| 1) Procedure to be written in the first 15 minutes | 10 Marks |
| 2) Recording of data and reporting the value | 15 |
| Marks upto 2% error | |
| Error up to 5% | 10 Marks |
| Error greater than 5% | 5 Marks |
| 3) Viva – Voice | 5 Marks |
| 4) Record | 5 Marks |

III B.SC., Petroleum & Petrochemicals

Project work.

Marks: 50

(At the end of 6th Semester)

Project work	...	40	Marks
VIVA	...	10	Marks

Total	...	50	Marks
		=====	