

**DR. A.P.J. ABDUL KALAM TECHNICAL
UNIVERSITY LUCKNOW**



Study & Evaluation Scheme with Syllabus

for

B.Tech. Second Year

Plastic Engineering

On

Choice Based Credit System

(Effective from the Session: 2017-18)

2nd Year III-SEMESTER

| S. No. | Subject Code | Subject Name | L-T-P | Th/Lab ESE | Sessional | | Total | Credit |
|--------------|---|--|-------|---------------|-----------|----|-------------|-----------|
| | | | | | CT | TA | | |
| 1. | RAS301/ ROE030 to 034, 036, 038, 039 | Mathematics-III/ Science Based OE | 3-1-0 | 70 | 20 | 10 | 100 | 4 |
| 2. | RVE301/ RAS302 | Universal Human Values & Professional Ethics / Environment & Ecology | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 3. | RCE303 | Fluid Mechanics | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 4. | RME301 | Material Science | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 5. | RME302 | Thermodynamics | 3-1-0 | 70 | 20 | 10 | 100 | 4 |
| 6. | RME303 | Mechanics of Solids | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 7. | RCE353 | Fluid Mechanics Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 8. | RME351 | Material Science & Testing Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 9. | RME352 | Thermodynamics Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 10. | RME353 | Computer Aided Machine Drawing-I Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 11. | RME101* | Elements of Mechanical Engineering* | 3-1-0 | 70 | 20 | 10 | 100* | -- |
| 12. | RCE151* | Computer Aided Engineering Graphics* | 0-0-3 | 50 | 30 | 20 | 100* | -- |
| TOTAL | | | | | | | 1000 | 24 |

CT: Class Test

TA: Teacher Assessment

L/T/P: Lecture/ Tutorial/ Practical

***B.Tech. IInd year lateral entry students belonging to B.Sc. Stream, shall clear the subjects RCE151/RCE251 and RME101/201 of the first year Engineering Programme along with the second year subjects.**

Science Based Open Electives:

- a. ROE030/ROE040 Manufacturing Process
- b. ROE031/ROE041 Introduction to soft computing
- c. ROE032/ROE042 Nano Science
- d. ROE033/ROE043 Laser System and Application
- e. ROE034/ROE044 Space Science
- f. ROE036/ROE046 Nuclear Science
- g. ROE038/ROE048 Discrete Mathematics
- h. ROE039/ROE049 Applied Linear Algebra

2nd Year IV-SEMESTER

| S. No. | Subject Code | Subject Name | L-T-P | ESE Marks | Sessional | | Total | Credit |
|--------------|--------------------------------------|---|-------|-----------|-----------|----|-------------|-----------|
| | | | | | CT | TA | | |
| 1. | ROE040 to 044, 046, 048, 049/ RAS401 | Science Based OE/ Mathematics-III | 3-1-0 | 70 | 20 | 10 | 100 | 4 |
| 2. | RAS402/ RVE401 | Environment & Ecology/ Universal Human Values & Professional Ethics | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 3. | REE409 | Electrical Machines & Controls | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 4. | RME401 | Measurement and Metrology | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 5. | RPL401 | Industrial Chemistry | 3-1-0 | 70 | 20 | 10 | 100 | 4 |
| 6. | RPL402 | Fundamentals of Polymer Science | 3-0-0 | 70 | 20 | 10 | 100 | 3 |
| 7. | REE459 | Electrical Machines and Controls Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 8. | RME451 | Measurement and Metrology Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 9. | RPL451 | Industrial Chemistry Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 10. | RME453 | Computer Aided Machine Drawing-II Lab | 0-0-2 | 50 | 30 | 20 | 100 | 1 |
| 11. | RME201* | Elements of Mechanical Engineering* | 3-1-0 | 70 | 20 | 10 | 100* | -- |
| 12. | RCE251* | Computer Aided Engineering Graphics* | 0-0-3 | 50 | 30 | 20 | 100* | -- |
| TOTAL | | | | | | | 1000 | 24 |

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***B.Tech. IInd year lateral entry students belonging to B.Sc. Stream, shall clear the subjects RCE151/RCE251 and RME101/201 of the first year Engineering Programme along with the second year subjects.**

NOTE: Practical summer training-1 of 4-weeks after IV semester or Minor fabrication project will be evaluated in VII semester.

- a. ROE030/ROE040 Manufacturing Process
- b. ROE031/ROE041 Introduction to soft computing
- c. ROE032/ROE042 Nano Science
- d. ROE033/ROE043 Laser System and Application
- e. ROE034/ROE044 Space Science
- f. ROE036/ROE046 Nuclear Science
- g. ROE038/ROE048 Discrete Mathematics
- h. ROE039/ROE049 Applied Linear Algebra

RPL401: INDUSTRIAL CHEMISTRY

UNIT I

Stereoisomerism: Geometrical isomerism with and without chirality, concept of aromaticity directive influence of substitute. Criteria & techniques of purity of compounds. Melting point, Boiling point, recrystallisation, various distillations. Distillation of petroleum, refining of various fraction, Cracking.

UNIT II

Chemical Kinetics: Kinetics of parallel side, opposite, consecutive and chain reactions, fast reactions fundamental aspect of kinetics of reactions in solution. Catalysis: Acid basis catalysis, Enzyme catalysis, heterogeneous reactions.

UNIT III

Reactions, Synthesis & mechanism: Hydrocarbons including cyclic, alcohol, phenols, aldehyde & ketones, carboxylic acids & their derivatives, halides, nitro, amino & diazo compounds.

UNIT IV

Conformational analysis: Various terms, conformation analysis of ethane, cyclohexane & 1,2 disubstituted cyclohexane Heterocyclic: Classification, preparation and properties of pyridine. Bimolecules: Structures & reactions of mono & disaccharides, proteins.

UNIT V

Surface chemistry: adsorption, adsorption isotherms, surface tension and its determination. Colloids chemistry: General preparation properties and classification hydrophilic and lyophobic sols.

Books and References:

1. Finar, IL, "Organic Chemistry: Vol. I & II".
2. Morrison & Boyd, "Organic Chemistry".
3. March, J., "Organic Chemistry".
4. Soloman, T., "Organic Chemistry".
5. Glasstone, S., "Physical Chemistry".
6. Atkin, PW, "Physical Chemistry".
7. Banwell, CN, "Fundamentals of Molecular Spectroscopy".
8. Willard Merit & Dean "Instrumental Methods of Chemical Analysis".
9. Skoog & West "Instrumental Methods of Chemical Analysis".

RPL402: FUNDAMENTALS OF POLYMER SCIENCE

UNIT I

History of polymer science, Classification of Polymers, Functionality and structure of polymers, Physical properties and characterization of polymers, effect of structure on properties of polymers, Inorganic polymers. Concept of macromolecules. Stereochemistry of polymers.

UNIT II

Introduction, Chain & step growth polymerization, Polymerisation techniques, Kinetics of Polymerisation (Free radical, Cationic, Anionic polymerization, Polycondensation).

UNIT III

Molecular weight, Number average and weight average molecular weight, Sedimentation and Viscosity average molecular weight, Molecular weight and degree of polymerization, Polydispersity, Size of polymer molecules.

UNIT IV

Glass transition temperature, Transitions, significance and factors influencing the T_g . Effect of Plasticizers on T_g . Glass transition of copolymers.

Morphology and order of Polymers, Crystallinity in polymers, Degree of crystallinity and Polymer crystallization. Effect of crystallinity on properties of Polymers.

UNIT V

Polymer degradation and stability. Types of degradation. Mechanism of degradation. Factors affecting degradation.

Polymer solutions. Process of dissolution of polymers. Thermodynamics of Dissolution. Flory-Huggins Theory, Viscosity of Polymeric solutions.

Books and References:

1. Plastics Material, Brydson, J.A
2. Text Book of Polymer Science, Billmeyer, Fred W.
3. Principles of Polymer Systems By Ferdinand Rodriguez
4. Principles of Polymer Chemistry By A. Ravve
5. Introduction of Polymer Science By Hans-Georg Elias
6. Polymer Science & Technology By Joel R. Fried.
7. Polymer Science By Gowariker V R, Vishwanathan NV, Jayadev Sreedhar.

RPL 451:INDUSTRIAL CHEMISTRY LAB

Minimum 8 experiments out of following (or such experiment) are to be performed:

1. Identification of liquid organic compounds.
2. Identification of two organic compounds (one water soluble and one water insoluble) in a mixture.
3. Minor estimation of phenol, glucose & aniline.
4. Preparation of p- Nitro acetanilide from Acetanilide.
5. To find out the percentage composition of given solution by viscosity measurement with the help of Ostwald's viscometer.
6. To verify the distribution of Particle Size.
7. To determine the rate constant (K) for the hydrolysis of Ethyl Acetate catalyzed by HCl acid.
8. To determine the molecular weight of the given compounds by elevation of boiling point.
9. To determine the molecular weight of the given compounds by depression of freezing point.
10. To determine pH of a solution.