

**FURTHER DETAILS REGARDING MAIN TOPICS OF  
PROGRAMME NO. 11/2015/ONLINE (Item No. 7)**

**LECTURER IN POLYMER TECHNOLOGY  
(POLYTECHNICS)**

**TECHNICAL EDUCATION**

**(CATEGORY No. 60/2014)**

***Part I : General Polymer Science***

Monomers, functionality, degree of polymerizations, classification of polymers, glass transition, melting transition, criteria for rubberiness.

Polymerization methods: addition and condensation; their kinetics, metallocene polymers and other newer techniques of polymerization, copolymerization, monomer reactivity ratios and its significance, kinetics, different copolymers, random, alternating, azeotropic copolymerization, block and graft copolymers, Solubility and swelling, concept of average molecular weight, determination of number average, weight average, viscosity average and Z-average molecular weights, polymer crystallinity.

Techniques for copolymerization: - bulk, solution, suspension, emulsion.

***Part II : Polymeric Materials***

Manufacture structure properties and applications of Natural and Synthetic Rubbers: NR, SBR, Polyisoprene, Acrylonitrile Butadiene Rubber, Polychloroprene, EPDM, Butyl, Hypalon, Silicones, Polyurethanes, Fluorocarbons, Ethylene Vinyl Acetate.

Preparation and properties of PE, PP, PS, PVC, Polyester, Acrylic, Nylon, PC, PBT, PPO, ABS, PF, MF, UF, Epoxy, Unsaturated Polyester, Alkyds

Manufacture, properties and applications of different thermoplastic elastomers.

***Part III : Polymer Characterization and Testing***

Analysis of polymers using IR, XRD, thermal (DSC, DMTA, TGA, DMA), microscopic (optical and electronic) TEM, SEM, AFM, POM techniques.

Quality control tests on natural rubber and important synthetic rubbers. Specification tests on natural rubber latex. Viscometers, Rheometers, Plastimeters, testing for elastic properties, scorch cure rate, optimum cure time, MFI, density, dimensional measurements, gel time etc Mechanical-static and dynamic tensile, flexural, compressive, abrasion, endurance, fatigue, hardness, tear, resilience, impact, toughness. Conductivity-thermal and electrical, dielectric constant, dissipation factor, power factor, electric resistance, surface resistivity, volume resistivity, swelling, ageing resistance, environmental stress cracking resistance.

Testing to be carried out in products like tyres, tubes, beltings, hoses, dipped goods and foam rubber. Laminates, films, footwear and cables and wires.

#### **Part IV : Polymer Processing**

Compression molding, transfer molding, injection molding, blow molding, reaction injection molding, extrusion, pultrusion, calendaring, rotational molding, thermoforming, rubber processing in two-roll mill, internal mixer.

#### **Part V : Polymer Rheology**

Polymer viscoelasticity, Flow of Newtonian and non-Newtonian fluids, different flow equations, dependence of shear modulus on temperature, molecular/segmental deformations at different zones and transitions. Measurements of rheological parameters by capillary rotating, parallel plate, cone-plate rheometer. Viscoelasticity-creep and stress relaxations, mechanical models, control of rheological characteristics through compounding, rubber curing in parallel plate viscometer, ODR and MDR

#### **Part VI : Rubber Product and Manufacture**

Manufacturing techniques of various tyres like two wheeler and car tyres, truck tyres, OTR, farm tyres, aircraft tyres, tyre related products like tubes, flaps, bladders, valves their design and manufacturing Reinforcement of elastomers by fillers. Factors influencing reinforcement and mechanism of reinforcement. Compounding and manufacture of cycle tyres and tubes, solid tyres, mechanical seals, sports goods, surgical products and miscellaneous moulded, extruded and calendered rubber products. Compounding techniques and manufacturing methods for the production of foot wears, conveyor and power transmission belts, hoses and tubing, rubber covered cables and wires, cellular rubber products and hard rubber products, tank, pipe and valve lining, shock absorbers and anti vibration mountings.

#### **Part VII : Polymer Blends and Composites**

Difference between blends and composites, their significance, choice of polymers for blending, blend miscibility-miscible and immiscible blends, thermodynamics, phase morphology, polymer alloys, polymer eutectics, plastic-plastic, rubber-plastic and rubber-rubber blends, FRP, particulate, long and short fibre reinforced composites

#### **Part VIII : Latex Technology**

Latex properties and test methods for TSC, DRC, mechanical stability, chemical stability, KOH No., VFA No., sludge content, coagulum content, Comparison of natural and synthetic lattices, Colloid stability and destabilization of latex, Preparation of dispersions and emulsions. Latex spreading combining and doubling, Latex foam rubber: General principles of latex foam production. The Dunlop process, batch foaming and continuous foaming process, Talalay process Latex dipping Simple dipping, Coacervant dipping - Heat sensitized dipping, Electro deposition. Moulding and casting.

#### **Part IX: General Knowledge, Current Affairs & Renaissance in Kerala**

##### **Salient Features of Indian Constitution**

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

### **Social Welfare Legislations and Programmes**

Social Service Legislations like Right to Information Act, Prevention of atrocities against Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

### **Renaissance in Kerala**

#### **TOWARDS A NEW SOCIETY**

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press etc.

#### **EFFORTS TO REFORM THE SOCIETY**

##### **(A) Socio-Religious reform Movements**

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha Raksha Daiva Sabha, Sahodara Prasthanam etc.

##### **(B) Struggles and Social Revolts**

Upper cloth revolts.Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam Sathyagraha. Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act .Malyalee Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

#### **ROLE OF PRESS IN RENAISSANCE**

Malayalee, Swadeshabhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, AI-Ameen, Prabhatham, Yukthivadi, etc

#### **AWAKENING THROUGH LITERATURE**

Novel, Drama, Poetry, *Purogamana Sahithya Prasthanam, Nataka Prashtanam*, Library movement etc

### **WOMEN AND SOCIAL CHANGE**

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu.Akkamma Cheriyan, Anna Chandi, Lalithambika Antharjanam and others

### **LEADERS OF RENAISSANCE**

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali, Chattampi Swamikal, Brahmananda Sivayogi, Vagbhadananda, Poikayil Yohannan(Kumara Guru) Dr Palpu, Palakkunnath Abraham Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan, Pampadi John Joseph, Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi, Makthi Thangal, Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth Kumaran, C. Krishnan, K P Kesava Menon, Dr.Ayyathan Gopalan, C V Kunjuraman, Kuroor Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C Kesavan. Swami Ananda Theerthan , M C Joseph, Kuttippuzha Krishnapillai and others

### **LITERARY FIGURES**

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran, Kandathil Varghese Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer, G Sankara Kurup, Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer. Kesav Dev, Thakazhi Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

### **General Knowledge and Current Affairs**

General Knowledge and Current Affairs

***NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.***