

# A.P.P.S.C. Government Polytechnic College Lecturer Posts

## Electronics & Communication Engineering Syllabus

### Paper I: General Studies and Mental Ability

- Major Current Events and Issues of International, National, and State of Andhra Pradesh.
- General Science and its applications to the day to day life Contemporary developments in Science & Technology and Information Technology.
- History of India – emphasis will be on a broad general understanding of the subject in its social, economic, cultural, and political aspects with a focus on AP and the Indian National Movement.
- Geography of India with a focus on Andhra Pradesh.
- Indian polity and Governance: constitutional issues, public policy, reforms and eGovernance initiatives.
- Indian Economy and Planning
- Sustainable Development and Environmental Protection
- **Disaster management:** vulnerability profile, prevention, and mitigation strategies, Application of Remote Sensing and GIS in the Assessment of Disaster
- Logical reasoning, analytical ability, and logical interpretation.
- **Data Analysis:** Tabulation of data Visual representation of data Basic data analysis (Summary Statistics such as mean, median, mode, and variance) and Interpretation.

### Paper II: Chemistry

#### Inorganic Chemistry:

1. Chemical periodicity: Periodic properties
2. Atomic structure, nuclear properties, molecular symmetry, bonding in polyatomic molecules, concepts of acids and bases
3. Main group elements and their compounds: Synthesis, bonding and structure.
4. Transition metal Chemistry and coordination compounds: Structure and bonding, Molecular Orbital (MO) theory of complexes, Crystal field theory (CFT), Jahn-Teller effect, magnetic properties, orbital splitting, spin-orbit coupling, calculation of CFSE, spectra of octahedral and tetrahedral complexes of d1 to d9 systems, and reaction mechanisms
5. Organometallic compounds, their synthesis, bonding and structure, and reactivity. Organometallic compounds in homogenous catalysis.
6. Cage like structures and metal clusters

7. Analytical Chemistry: separation techniques, spectroscopic electro- and thermoanalytical methods.

8. Bioinorganic Chemistry — photosystems, porphyrins, metallo-enzymes, oxygen reactions, electron transfer, nitrogen fixation.

9. Characterization of inorganic compounds by infrared-, Raman- NMR-, electron spin resonance (EPR)-, UV-Visible, and Mass spectroscopic techniques

10. Nuclear chemistry — nuclear reactions, fission and fusion and their applications, radio-analytical techniques and activation analysis.

### **Physical Chemistry:**

11. Quantum mechanics: Fundamental concepts and applications, hydrogen atom, and angular momentum

12. Atomic structure and hydrogen atom spectra, chemical bonding

13. Group theory: Basic principles and applications

14. Kinetic theory of gases: Equations of state and collision theory

15. Chemical Kinetics: order and molecularity of reactions, Arrhenius

16. equation, Activated complex theory of bimolecular gaseous reactions and Lindemann theory of unimolecular gaseous reactions, experimental methods for studying reaction rates.

17. Chemical Thermodynamics: First Law, Joule-Thomson effect, Thermochemistry, Second law, Entropy, Maxwell relations, Van't Hoff equation

18. Electrochemistry: Electrochemical cells and cell reactions, Standard electrode potentials, Nernst equation, specific, equivalent and molar conductivities, Kohlrausch's law; Concentration cells, Debye-Huckel theory and Debye-HuckelOnsager equation, transport number and ionic mobility, potentiometric and conductometric titrations, electrical double layer.

19. Photochemistry: Laws of photochemistry, Grothus-Draper Law, Stark- Einstein law, kinetics of photochemical reactions

20. Statistical Thermodynamics: Types of statistics, partition functions, thermodynamic properties of monoatomic ideal gases, Einstein theory of heat capacities

20. Surface Chemistry: Adsorption isotherms. And BET theory of multilayer adsorption

21. Catalysis: Acid-base catalysis, enzyme catalysis, Michaelis-Menten equation, heterogeneous catalysis.

22. Molecular spectroscopy: Principles and applications of rotational and vibrational spectroscopy, NMR and EPR.

23. Chemical equilibrium: basic concepts, Solubility product, common ion effect, pH and buffer solutions, acids and bases, hydrolysis of salts, phase equilibrium.

24. Solid state: crystal systems, classification of binary and ternary compounds, diffraction techniques, bonding.

**Organic Chemistry:**

25. Heterocyclic compounds- classification based on the nature of hetero-atom, size of the ring and electron deficient nature of the ring.

26. General and comparative study of furan-, pyrrole- and thiophene- ring transformations. Comparison with benzenoid compounds: pyridine, quinoline, isoquinoline and acridine.

27. Aromaticity of cyclic compounds: synthesis, reactivity and properties.

28. Organic reaction mechanisms: Structure and reactivity of organic molecules-inductive effect, mesomeric (resonance) effect and hyper-conjugation, dipole moments, acidic and basic strengths of organic compounds.

29. Concepts of organic reaction mechanisms: Aromatic substitutions: Electrophilic and Nucleophilic substitutions (SN1, SN2, SNi, SN2'), Elimination (E1 and E2), Cope- and Hofmann- eliminations.

30. Study of reaction intermediates: classical and non-classical carbocations-, carbanions-, carbon free radical- and carbene- in organic reactions.

31. Rearrangements: Dienone-Phenol-, Baeyer-Villiger-, Favorskii-, Beckmann-, Perkin-, Fries-, Pinacol-pinacolone- rearrangements.

32. Name reactions: Wurtz-, Friedel-Crafts-, Gattermann-, Diels-Alder-, Reformatsky-, Rosenmund- reactions.

33. Organometallic reagents and their application to organic reactions: RMgX, RLi, RZnX, R<sub>2</sub>CuLi

34. Transition metal catalysis: Heck-, Stille-, Sonogashira-, Suzuki-, Buchwald-Hartwigcoupling reactions.

35. Carbohydrates: General reactions of monosaccharides — configurational studies on glucose, fructose, sucrose, and recent advances in the Chemistry of cellulose and starch.

36. Proteins: Introduction to proteins, their classification, nomenclature and distribution in nature, simple amino acids — their isolation and their synthesis.

37. Alicyclic compounds: Mono-terpenes

38. Stereochemistry: Optical and geometric isomerism, configuration of saturated molecules, dextro and laevo, and R- and S- configurations of optically active compounds, racemic mixtures, racemization and resolution.

39. Characterization of organic compounds by infrared (IR)-, NMR-, UV-Visible-, and Mass spectroscopy techniques.