MP-04
SOLID STATE ELECTRONICS

(Questions will be set from each unit/section with internal choice)

Units	Topics
I	**Transistor Amplifier, Operating Point, Bias and Thermal Stability** Operating point, factors contributing to thermal stability, Biasing technique collector to base, self bias and voltage divider bias, stabilization against variation in VBE and B Bias compensation. Transistor equivalent circuits - V (Admittance) and hybrid parameters. Conversion of CB to CE hybrid parameters and CB to CC hybrid parameters. Analysis of transistor amplifier using hybrid model. R-C coupled CE amplifier and its frequency response, low and high frequency compensation, cascade stages.
II	**Feedback Circuits:** Feedback in amplifiers, negative feedback and gain stability effect of feedback on input and output impedances and distortions, current and voltage feedback circuits, Emitter follower, circuits and working of Hartley, Colpitt and Phase shift oscillators. UJT and its characteristics, UJT as relaxation oscillators. Transistor as a switch a stable, monostable and bistable multivibrators.
III	**Operational Amplifier:** Differential amplifier circuits and working of operational amplifier, OPAMP parameters, inverting and non-inverting OPAMP amplifiers. Use of 741 IC as adder, subtractor, differentiator and integrator, OPAMP as constant current source, comparator, square and triangular wave generator. Voltage multipiers circuits, wave shaping circuits, clipping, clamping, differentiating and intergrating circuits, Voltage regulated power supply, regulation sensitivity and stability factors, Over voltage and short circuit performance (Transistorised). Three terminal IC regulated power supply circuits for positive and negative voltages.
IV	**Communication Electronics:** Types of modulation analysis and production of AM and FM wave Generation DSBSC modulation, of AM waves, demodulation of AM waves Generation of DSBSC waves, coherent detection of DBSSC waves, SSB modulation, Generation and detection of SSB waves, vestigial sideband modulation, frequencies division multiplexing.
V	**DEVICES Electronic Devices:** JFET, MOSFET and MESFET, structure & working, IV characteristics under different condition, microwave devices tunnel diode and Gunn diode, impatt diodes and parametric devices. **Photonic Devices** - reditives and non radiative transmitter, LDR, photodiode detectors, solar cells (open circuit voltage, short circuit element and fill factor), LED (high frequency limit) diode lasers condition for population inversion light confinement factor, optical gain and threshold current for lasing.

Note: It is hereby recommended that M.Sc. students should go on educational tour to research laboratories and research oriented industries for getting better exposure in modern scientific techniques. The tour should be of nearly two weeks duration.