**TEACHING & EXAMINATION SCHEME**

For the Examination – 2020

ELECTRONICS

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|  |  | **B.Sc. Part II** |  |  |  |
| **THEORY** |  |  |  |  |  |
|  |  |  | Pd/W | Exam. | Max. |
|  |  |  | (45mts.) | Hours | Marks |
|  |  |  |  |  | 150 |
| Elec. 201 | Paper I | Amplifiers | 2 | 3 | 50 |
| Elec. 202 | Paper II | Feedback systems | 2 | 3 | 50 |
| Elec. 203 | Paper III | Communication Electronics | 2 | 3 | 50 |
|  | |  |  |  |  |
| **PRACTICAL** | |  | 6 | 5 | 75 |
|  |  |  |  |  |  |
|  |  | **Total** |  |  | **225** |
|  |  |  |  |  |  |

**B.Sc. Part II**

**Paper I : Amplifiers**

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

**Section – A:** Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

**Section – B:** Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

**Section – C:** Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

Unit 1 :

Transistor biasing, bias stabilization and Operating point, thermal instability, stability factor, fixed bias, collector to base bias, emitter bias, voltage divider bias with emitter bias and emitter by pass capacitor.

Unit 2 :

Small signal transistor amplifier Small signal hybrid equivalent circuits at low frequencies, analysis of transistor amplifier using h - parameters, current gain, input impedance, voltage gain and output impedance, comparison of CE, CB, CC amplifiers, Maximum available power gain, cascading transistor amplifiers.

Unit 3:

Frequency response of amplifier :Amplifier using triode, pentode, FET's, input capacitance, miller effect, bias methods, R.C. coupled amplifiers, voltage gain at low, mid and high frequencies, gain band width product. effect of cascading on gain and bandwidth.

Unit 4:

Large signal (power) amplifier : Class A, Class B and class C operations, efficiencies, distortions, power amplification, push pull amplifiers using transistors, transistor phase inverter, Class C tuned amplifier, commercial AF amplifier.

Unit 5 :

Wide band (or video) amplifier :Band width requirement, high frequency hybrid π circuits for transistors, pulse testing, rise time, sag, various compensation techniques

**Paper II : Feedback systems**

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

**Section – A:** Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

**Section – B:** Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

**Section – C:** Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

Unit 1:

Feedback : General theory of feedback, characteristics of negative feedback - gain, stability, distortion, noise, frequency response, effect of negative feedback on input and output impedances of an amplifier, Voltage feedback- series input, shunt input, current feedback- series input and shunt input.

Unit 2 :

Feedback amplifier: CE amplifier with current series and voltage shunt feedback, emitter follower, cathode follower and source follower, Cascade amplifier for tube, transistor and FET, Darlington pair, bootstrapping principle.

Unit 3 :

Oscillators : Positive feedback and Barkhausen criterion, RC phase shift oscillator, Wein bridge oscillator, LC oscillators, tuned collector and tuned base, Hartley and Colpitt oscillators.

Unit 4:

Operational Amplifier : Ideal operational amplifier, practical inverting and non inverting operational amplifiers, differential amplifier, common - mode rejection ratio ( CMMR) emitter coupled differential amplifier, offset error voltages and currents, universal balancing techniques, input and output impedances of Op-Amp amplifier, oscillators using Op-Amp.

Unit 5 :

Analog Computation : Basic building blocks of analog computer, solution of linear differential equations with constant coefficients, analog computer symbols, time and amplitude scaling technique, estimation of maximum values, combined time and amplitude scaling

**Paper III : Communication Electronics**

Note: The question paper for the examination will be divided in three parts i.e., Section – A, Section – B and Section – C.

**Section – A:** Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited upto 30 words. Each question will carry 1 mark.

**Section – B:** Will consist of 10 questions. Two questions from each unit will be set and students will answer one question from each Unit. Answer of each question shall be limited upto 250 words. Each question carry 3.5 marks.

**Section – C:** Will consist of total 05 questions. The paper setter will set one question from each Unit and students will answer any 03 questions and answer of each question shall be limited upto 500 words. Each question will carry 7.5 marks.

Unit 1:

Modulation : Need of a carrier frequency, AM, FM, PM, PCM, side bands, power consideration, collector and base modulation circuits. SSB transmission, FM by reactance variation using transistor, Armstrong PM system, block diagram of AM and FM transmitters

Unit 2:

Demodulation : Demodulation of AM signals, square law demodulation, linear envelope detector, AGC, demodulation of FM signals, amplitude limiter, Foster- Seeley frequency discriminator, Ratio detector

Unit 3:

Transmission line: Propagation constant, characteristic impedance, reflection on a line not terminated in characteristics impedance, reflection coefficient, open and short circuited lines, SWR, Impedance properties of λ/4 and λ/2 lines, stub matching.

Unit 4:

Antennas :Dipole, quarter wave and half wave antenna and their radiation patterns, effect of ground, grounded antenna and antenna arrays

Unit 5 :

Propagation of radio waves : Ground wave, sky wave and space wave propagation, structure of ionosphere, refraction and reflection of sky wave by ionosphere, refractive index, critical frequency, MUF, skip distance and fading.

**Books Suggested :**

Millman and Halkais : Electronic Devcies and Circuits TMH

Mottershead : Electronics Devices and Circuits PHI, 1984

Ryder : Networks, Lines and Fields PHI 1983

Terman : Electronic and Radio Engineering, McGraw Hill

Kennedy: Electronic Communication Systems, McGraw Hill

**Experiments for Practical Work**

1. Study the Characteristics of Pentode
2. Study the frequency responseof two stage RC coupled transistor Amplifier
3. Study the frequency responseof two stage RC coupled FET Amplifier
4. Study the frequency response of two stage RC coupled tube Amplifier
5. Study the frequency responseof a current series negative feedback amplifier
6. Measurement of gain, input and output impedance of an voltage amplifier
7. Measurement of gain, input and output impedance of emitter follower
8. Measurement of gain, input and output impedance of source follower
9. Study of Darlington pair emitter follower.
10. Design and study of passive filter Circuits (low pass, High pass and band pass)
11. Design and study of cascading of filters circuits to simulated transmission lines
12. Design and study of half wave and full wave rectifier with different filters.
13. To trace the output of half wave and full wave rectifier with different filters using CRO.
14. Study the V-I characteristics of SCR.
15. Study the V-I characteristics of the UJT.
16. Study the V-I characteristics of a solar cell.
17. Study the frequency response of operational amplifier as inverting amplifier.
18. Study of Differential amplifier and determine its CMRR.
19. Study of voltage divider bias for BJT amplifier and find its operating(Q) point.
20. Study of Cascode Amplifier.
21. Measurement of transistor Hybrid parameters.
22. Study of power amplifier.
23. Measurement of ac voltage operating range and determination of Band width using CRO for a single stage CE amplifier
24. Study of phase and gain variations in low, mid and high frequency regions of a voltage amplifier

Note: - New experiments may be added on availability of equipment.