Course: B. Sc. Ist Year with Electronic Equipment Maintenance

Scheme of Examination for Semester 1 & 2

Semester - I

S.No.		Paper	Marks	Marks	Exam. Duration
			Internal Assessment	External Marks	
1.	Paper-I	Principles of Electronics-I	10*	30	3 hours
2.	Paper-II	Electronic Devices, Components & Assemblies-I	10*	30	3 hours

Semester - II

S.No.		Paper	Marks	Marks	Exam. Duration
			Internal Assessment	External Marks	
3.	Paper-I	Principles of Electronics-II	10*	30	3 hours
4.	Paper-II	Electronic Devices, Components & Assemblies-II	10*	30	3 hours
5.	Paper-III	Practical (Sem 1 & Sem 2)	------------	80	6 hours (two sessions morning & evening)
6.	Paper-IV	On Job Training	-----------	60	

* 10% on the basis of two hand written assignments, 5% on the basis of one class test & 5% on the basis of attendance of the student

UPDATED SCHEME OF EXAMS. & SYLLABI FOR B.SC.

Course: Bachelor of Science (B. Sc.) 1st year

Subject: Electronic Equipment Maintenance
Scheme of Examination for Semester 1 & 2

(i) Theory: Two papers of 30+10*= 40 marks each in each semester.
Note: Common for both the Theory papers:

The syllabus in each paper is divided into 4 units. Two questions will be set from each Unit. A student is to attempt 5 questions in all selecting one question from each unit. Question No. 1 is compulsory which will be based on 4 units.

* For each paper question paper will be of 30 marks and 10 marks in each theory paper are awarded through internal assessment in each semester.

(ii) Practical: 80 marks

Note: On Practicals:

1. The practical examination will be held at the end of second semester in two sessions of three hours each with first session starting in the evening of the first day and second session in the following morning.

2. Distributions of marks is as under:

Experiment Performed: 20+20
Lab Record: 20
Viva Voce: 10+10

(iii) On Job Training: 60

The training will be of 4 weeks duration and will be undertaken in an Industry/Research Laboratory approved by the Training-In-Charge. After the successful completion of the training, the student will be required to submit a Training Report before the start of the next session. The training will be evaluated by a panel of two examiners (one external and one internal) by conducting a Viva-Voce on the basis of the Report.

Max. Marks: 30+10*
Time: 3hrs.

Unit-I

Number Systems: Introduction to Decimal, Binary, Octal, Hexadecimal Number Systems and their inter-conversions; BCD codes, Excess-3 codes, Gray codes, Cyclic codes, code conversions; parity, binary arithmetic, 1's and 2's compliments and 9's and 10's compliments.

Unit-II

Boolean algebra: postulates and theorems of Boolean algebra, De-Morgan's Theorem, Reducing Boolean expressions. Logic Gates: Positive and Negative Logic, Basic Logic Gates: AND, OR, NOT (symbol, truth-table, circuit diagram, working); NAND, NOR, EX-OR, EX-NOR (symbol, truth table).

Unit-III

Minimization Techniques: Introduction, SOP and POS form of Boolean functions, Karnaugh Map simplifications (up to 4 variables), implementations of SOP and POS form using NAND and NOR gates.

Unit-IV

Combinational circuits: half adder, full adder, 8421 adders, 1's & 2's complement Adder/subtractor, Excess-3 adder, multiplexer, demultiplexer, encoders and decoders.

Ref.:
1. Digital Electronics by R.P. Jain
2. Digital Computer Electronics by A. P. Malvino

Semester-I
Subject: EEM
Paper-II (Theory)
Nomenclature: Electronic Devices, Components and Assemblies-I

Max. Marks: 30+10*
Time: 3hrs.

Unit-I

Passive Components: Resistors, Capacitors, Inductors, Transformers, Relays, Fuses (their types & applications).
Introduction to Semiconductors: Energy Band Diagram, Conductors, Semiconductors, Insulators, Intrinsic and Extrinsic Semiconductors (P&N), currents in semiconductors, Diffusion Junction, Depletion Layer, Barrier Potential.
Junction Diodes: Rectifying diode, Forward and reverse bias characteristics, Zener Diodes, Varactor Diode, Light Emitting Diode, Photodiode and Phototransistors (qualitative only).

Unit-II

Rectifiers: Half wave, Full wave, Bridge (calculation of ripple factor and rectification efficiency), Filters (L, C, LC, π), Clipping and Clamping circuits.
Bipolar Junction Transistor: Basic working principle, Input and Output Characteristics of CB & CE configurations, Biasing, Operating point, Load line, Stabilization of Operating Point, Self-Bias Arrangement.

Unit-III

Amplifiers: Classification of amplifiers, Class-A, B, AB and C Amplifiers, Cascading of Amplifiers, RC Coupled amplifiers. Properties of amplifiers (distortion, noise, thermal noise, shot noise, noise figure). Feedback in Amplifiers: Feedback concept, transfer gain with feedback, Effect of Negative Feedback on amplifiers performance.

Unit-IV

Field Effect Transistors: JFET, basic working principle, I/O Characteristics, pinch off Voltage, parameters, MOSFET, basic working principle, Characteristics. Basic **Measuring Instruments:** Regulated power supply, Analogue Multimeter, Digital Multimeter, Cathode Ray Oscilloscope, Function Generator (functional block diagram, basic working principle, measuring quantities).

Ref.:
1. Basic Electronics and Linear Circuits by Bhargava & Kulshreshtha (TTTI)
2. Integrated Electronics by Millman and Helkian

Semester-II

Subject: EEM
Paper-I (Theory)
Nomenclature: Principles of Electronics-II

Max. Marks: 30+10*
Time: 3hrs.

Unit-I

Network Analysis: Kirchoff's Voltage Law, Kirchoff's Current Law, Loop and Node Method, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem.

Unit-II

Two Port Networks: Impedance Parameters, Admittance Parameters, Hybrid Parameters, Inverse Hybrid Parameters, Transmission Parameters, Inverse Transmission Parameters, Transformation of parameters
Transducers: Basic idea of Transducers, Strain Gauge, photo voltaic cell, LDR.

Unit-III

Sequential circuits: Flip-Flop (RS, JK, Master-Slave JK, D and T-type), Shift Register, Binary Counters, Modulo-N counter, up-down counter.

Unit-IV

Maintenance Aids & Records: Tools, Importance of Service Manual and Component Data Book, workshop requisites, approach of a service engineer.

Soldering and Desoldering Techniques: Solder Joint, Dry Solder Joint, Cold Solder Joint, Good and Bad Solder Joints, Soldering Material, Soldering Tools, Soldering Iron, Soldering Gun, Soldering Station, Ultrasonic Soldering, Tools used for Desoldering, Desoldering Techniques, Soldering Techniques, Testing a Soldering Joint, precautions during Soldering and Desoldering.

Ref.:
1. Circuits and Networks by A. Sudhakar and Shyam Mohan
2. Instrumentation Repair and Maintenance by R.G. Gupta
3. Digital Electronics by R.P. Jain

Semester-II

Subject: EEM
Paper-II (Theory)
Nomenclature: Electronic Devices, Components and Assemblies-II

Max. Marks: 30+10*
Time: 3hrs.

Unit-I

Unijunction Transistor: Basic Working Principle, Characteristics, Applications as a switch and as time base generator. Power Control Devices: Four Layer Diode (PNPN), Silicon Controlled Rectifier (SCR), Triac, Diac (Principle, Characteristics and Applications).

Unit-II

Operational Amplifiers: Basic idea of an OPAMP with black box concept, emitter coupled differential amplifier, Transfer characteristics of a differential amplifier, IC 741 various parameters, offset error voltages and currents, temperature drift of input offset voltage and current, inverting and non-inverting amplifiers, virtual ground, summing, difference, integrator, differentiator.

Unit-III

Power Supplies: Regulated power supply, zener regulated power supply, transistorized series and shunt regulated power supply, block diagram of IC 723, regulated supply using IC 723, three terminal regulator ICs, IC based power supply study.

Unit-IV

Oscillators: Positive Feedback, Barkhausen criteria, Phase-Shift Oscillators, Wein Bridge Oscillators, Hartley's and Colpitt's Oscillators, Crystal Oscillators. IC555 (operation and applications as Monostable & Astable Multivibrators).

Ref.:
1. Integrated Electronics by Millman and Helkian
2. Operational Amnifier by Gyakwar

SEMESTER 1 & 2
Subject: EEM

Paper-III (Practical)

Max. Marks: 80
Time: 3+3 hrs.

List of Experiments:

Note: Minimum 5 experiments are to be performed from each section.

Section-A (Basic Electronics Devices Laboratory)

1. Practical use of:

(a) Multimeter (measurement of voltage, current, resistance).
(b) Power Supply (study the variation in line and load voltage)
(c) Oscilloscope (voltage and frequency measurement).

2. Study of Electronic Components:

(a) Resistor (study the types, potential divider arrangement).
(b) Capacitors (study the types).
(c) Switches, Relays, Fuse (basic function).

3. P-N Junction Diode (study V-I Characteristics).

4. Study of PN diode as wave clipping element.

5. Study of Zener Diode as a voltage regulator.

6. Study the characteristics of LDR.

7. Study of Transistors (manual study, CB/CE/CC Characteristics, parameters).

8. Study of Amplifiers (Design of CB/CE/CC, find R_{in}, R_o, A_v).

9. Design and testing of transistorised oscillators (any two):

   (a) RC-phase shift
   (b) Wein Bridge
   (c) Hartley
   (d) Colpitt

Section-B (Electronic Circuits Laboratory)

1. Familiarization with Breadboard, IC types, pin number, testing, IC Manual.

2. Familiarization with different types of LED's, seven segment displays. Study the use of 7447 BCD to seven segment decoder.

3. Verification of truth tables for two input AND, OR, NOT gates.

4. Design DTL NAND Gate using discrete components & verify its truth table.

5. Design TTL NAND Gate using discrete components & verify its truth table.

6. Study of Flip-Flop IC chips and designing of JK, D, T type flip-flops using

7. IC7400. Study of Shift Register using IC7476.

8. Study of Counter IC chips and design of divide by 2/5/10 counter.

9. Study of 4:1 multiplexer.