**KURUKSHETRA UNIVERSITY KURUKSHETRA**

Syllabi w.e.f session 2019-20

**Course: Bachelor of Science (B.Sc.)**

**Subject: Electronics**

**Examination Scheme**

**B.Sc Electronics Course Study Cum Examination Scheme Sem III & IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sem | Paper Code | Nomenclature Of Paper | InternalAssessment  | Max.Marks | TotalMarks | PassMarks | Exam Duration | Work load | ExamSystem |
| III | Paper-1 | Op-amp and Linear Integrated Circuits | 10 | 40 | 50 | 18 | 3 Hrs | 3 periods /week | Sem |
| Paper-2 | Digital Electronics-II | 10 | 40 | 50 | 18 | 3 Hrs | 3 periods /week |
| IV | Paper-1 | Oscillators and Multivibrators | 10 | 40 | 50 | 18 | 3 Hrs | 3 periods /week | Sem |
| Paper-2 | Advance Digital Electronics  | 10 | 40 | 50 | 18 | 3 Hrs | 3 periods /week |
| Common forSem III & Sem IV | Paper-3 | ELECTRONICS | - | 100 | 100 | 35 | 3+3 Hrs | 6 periods /week | Annual |

**Note**:

1. Practicals classes to be conducted during odd as well as even semester.
2. The Practical examination will be held at the end of even semester in two sittings of three hours each with First sitting starting in the evening session of the first day and second sitting in the following morning session.
3. A candidate is required to perform minimum of 6 experiments in each section out of the list provided during course of study in odd and even semester in corresponding session and is required to perform one experiment from each section in examination. Experiment from one section in First Sitting and experiment from other section in Second Sitting.
4. Distribution of Marks :
	* + 1. Paper III – 100 Marks of 3+3 Hours duration
			2. Lab Record: 20
			3. Experiments: 20 + 20
			4. Viva/Voce : 20+20

5. Maximum 10 students in one group during course of study and also in Examination.

**KURUKSHETRA UNIVERSITY KURUKSHETRA**

**Semester-III**

**Course: B.Sc**

**Subject: Electronics**

**Paper: I (Theory)**

**Nomenclature: - Op-amp and Linear Integrated Circuits**

 **Max. Marks: 40+10\***

 **Time: 3hrs.**

**Unit-I**

**Operational Amplifier- I:**

Double ended differential Amplifier, differential gain, Common-mode gain, CMRR, ideal operational amplifier, Basic Concept of Feedback in Opamp, Inverting & non-inverting configuration, Summing amplifier, Difference amplifier.

 **Unit-II**

**Operational Amplifier- II:**

Error sources in OP-Amp: Offset Voltages, input bias Current, input offset current, scalar multiplier, Division and Multiplication, effect of error sources on inverting, non-inverting configuration, integrating circuit, differentiating circuit, 1st order active filter using op-amp: LPF, HPF, Band Pass Filter.

 **Unit-III**

**I.C. Fabrication Technology:**

Basics of Integrated Circuit Technology, Monolithic fabrication technique, Different Fabrication Processes: Crystal growth, epitaxial growth, Oxidation, Masking and Etching, Diffusion of Impurities, Metallization, Transistors for Monolithic Circuits (NPN & PNP), Monolithic Diodes, Integrated Resistors, Classification of ICs (SSI, MSI, LSI and VLSI).

**Unit-lV**

**Regulated Power Supply:**

Principle of voltage regulation, Zener diode shunt regulator, BJT shunt regulator and BJT series voltage regulator, power supply regulation using op-amp, load regulation, short circuit protection ,current regulation using op. amp., Block Diagram of three terminal IC regulator(78xx, 79xx,), Boosted power supply

**Ref**: 1) Electronics for Scientist & Engineers by Vishwanathan, Mehta

 2) Op-amp and Linear Integrated Circuit by Ramakant A Gayakward

 3) Integrated Electronics by Millman & Halkias

 4) Electronic Devices and Circuits Discrete and Integrated by Y N Bapat.

**Note:**

* 1. Syllabus in each Theory Paper is divided in 4 units.
		1. A Student is required to attempt 5 questions in all.
		2. Question No 1 is compulsory, consisting of short answer type questions based on all the 4 units.
		3. Two questions will be set from each unit. A student is required to attempt one question from each unit.
		4. All questions carry equal marks.
			1. Use of simple calculator is permissible.
			2. Instructions should be imparted using SI system of units. Familiarity with CGS system of units should also be ensured.
			3. Distribution of Marks: 40+10.

\* Each theory question paper will be of 40 marks of 3 hours duration and 10 marks in each theory paper are to be awarded through internal assessment in each semester.

5. Work load – 3 periods per week per theory paper

**Semester-III**

**Subject: Electronics**

**Paper: II (Theory)**

**Nomenclature:-Digital Electronics-II**

 **Max. Marks: 40+10\***

 **Time: 3hrs.**

**UNIT -I**

**Combinational Circuits and Applications:**

Multiplexers, Demultiplexer, Decoder, Encoder, Parity bit generator and checker, Code Converter: BCD to Seven Segment, BCD to Cyclic Code, Binary to Decimal, Binary to Gray, Binary to Excess-3, Application of combinational circuit: adder circuit using Multiplexers, Boolean expression implementation using Multiplexer, Boolean expression implementation using Demultiplexer,

**UNIT -II**

**Sequential Circuits:**

Basic Sequential circuit, Asynchronous and Synchronous circuits, RS FF and JK Flip Flop, Race Around Condition, Master Slave JK flip flop, T and D Flip Flop, Excitation Table, Conversion of Flip Flop, State Diagram.

**UNIT -III**

**Counters:**

Asynchronous Binary Counters, Asynchronous Mod-N Counter, Synchronous counter: Design principle of Modulo- N Counters, UP-Down counters, Decade Counter, BCD Counter.

**Unit IV**

**Shift Registers and its Applications:**

Shift Registers, Serial-in serial out (SISO), Serial-in-parallel out (SIPO), parallel-in-serial-out (PISO) parallel-in-parallel-out (PIPO), Bi-directional shift register, Applications of shift register:Ring counter, Johnson Counter, Time delay, Sequence Generator

**Ref:**

1) Digital E1ectroqics & Micro computers - R. K. Gaur (4 th edition)

2) Modern Digital Electronics - R.P. Jain (4th edition)

3) Digital Principles and Applications by Leach Donald, Malvino AP (6 th Edition)

4) Digital fundamentals by R.P. Jain & Floyd.

**Note:**

1. Syllabus in each Theory Paper is divided in 4 units.
2. A Student is required to attempt 5 questions in all.
3. Question No 1 is compulsory, consisting of short answer type questions based on all the 4 units.
4. Two questions will be set from each unit. A student is required to attempt one question from each unit.
5. All questions carry equal marks.

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2. Use of simple calculator is permissible.

3 Instructions should be imparted using SI system of units. Familiarity with CGS

 system of units should also be ensured.

4. Distribution of Marks: 40+10.

\* Each theory question paper will be of 40 marks of 3 hours duration and 10 marks in each theory paper are to be awarded through internal assessment in each semester.

5. Work load – 3 periods per week per theory paper

**Semester-IV**

**Course: B.Sc**

**Subject: Electronics**

**Paper: I (Theory)**

**Nomenclature: - Oscillators and Multivibrators**

 **Max. Marks: 40+10\***

 **Time: 3hrs.**

**Unit-I**

 **Feedback in Amplifier:-** Classification of Amplifiers (voltage, current, Transconductance, Transresistance amplifier), Feedback concept, calculation of transfer gain in degenerative and regenerative feedbacks, Feedback topologies, Effect of negative feedback on gain, Non-linear distortion, Frequency response, Effect of negative voltage shunt feedback on inputand output resistance, Effect of negative voltage series feedback on input and output resistance, Effect of negative current shunt feedback on input and output resistance, Effect of negative current series feedback on input and output resistance.

 **Unit-II**

**Power Amplifier:-** Basic Circuit and working only of: Class A large scale amplifier, push pull amplifier, transformer coupled amplifier, Class B amplifier, Class AB amplifier, Darlington-pair, efficiency.

**Unit-III**

**Sinusoidal Oscillators:-** Principle of oscillations, condition for sustained oscillation (Barkhansen criterion), stability of oscillator, Principle, working and frequency calculation of RF oscillators (Hartley oscillator, Colpitts oscillator, crystal oscillator) and AF Oscillators (Wien Bridge oscillator, R-C Phase-shift oscillator)

**Unit- 1V**

**Multivibrator, Switching Devices & Circuits:-** Astable Multivibrator, Bistable Multivibrator, Monostable Multivibrator using BJT, Silicon controlled Rectifier (SCR), Triac, Diac, Triangular waveform generator, Schmitt Trigger, 555 Timer: Block diagram of 555 and its application as Astable & Monostable Multivibrator.

**Ref**: 1) Basic Electronics Solid state by B.L. Theraja.

 2) Opamp and linear circuits by Ramakant A Gayakward.

 3) Electronics for Scientist & Engineers by Vishvanathan & Mehta.

**Note:**

1. Syllabus in each Theory Paper is divided in 4 units.
2. A Student is required to attempt 5 questions in all.
3. Question No 1 is compulsory, consisting of short answer type questions based on all the 4 units.
4. Two questions will be set from each unit. A student is required to attempt one question from each unit.
5. All questions carry equal marks.

2. Use of simple calculator is permissible.

3. Instructions should be imparted using SI system of units. Familiarity with CGS system

 of units should also be ensured.

4. Distribution of Marks: 40+10

 \* Each theory question paper will be of 40 marks of 3 hours duration and 10 marks in

 each theory paper are to be awarded through internal assessment in each semester.

5. Work load – 3 periods per week per theory paper

**Semester-IV**

**Course: B.Sc**

**Subject: Electronics**

**Paper: II (Theory)**

**Nomenclature: - Advance Digital Electronics**

 **Max. Marks: 40+10\***

 **Time: 3hrs.**

**Unit -I**

**Digital to Analog conversion:**DACconversion, Types ofDAC conversion, Weighted Resistor Type DAC, R-2R Ladder Type DAC, The Switched Current source type DAC, The Switched Capacitor type DAC, DAC accuracy and resolution.

**Unit II**

**Analog to Digital Conversion:** ADCconversion, Types ofADC conversion, The Counter Type ADC, The Tracking type ADC, Flash type ADC, The Successive Approximation ADC, ADC accuracy and resolution

**Unit III**

 **Memories:** Parameters of memory**,** Volatile and non volatile memories, Memory organization & operation, ROM, PROM, EPROM, EEPROM, RAM (Static and dynamic), Expanding the size of memory, Content addressable memory/ associative memory,

**Unit IV**

**Programmable Logic Devices (PLDs):** Introduction, ROM as a PLD, Programmable Logic Array(PLA), Programmable Array Logic(PAL), Features of PLD, Complex Programmable Logic Devices(CPLDs), Field Programmable Gate Array(FPGA).

**Ref:**

1. Modern Digital Electronics - R.P. Jain
2. Digital Principles and Applications by Leach Donald, Malvino AP (6 th Edition)

**Note**

1. Syllabus in each Theory Paper is divided in 4 units.
2. A Student is required to attempt 5 questions in all.
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4. Two questions will be set from each unit. A student is required to attempt one question from each unit.
5. All questions carry equal marks.

2. Use of simple calculator is permissible.

3. Instructions should be imparted using SI system of units. Familiarity with CGS system

 of units should also be ensured.

 4. Distribution of Marks: 40+10.

 \*Each theory question paper will be of 40 marks of 3 hours duration and 10 marks in each theory paper are to be awarded through internal assessment in each semester.

 5. Work load – 3 periods per week per theory paper

**SEMESTER III & IV**

**Course: B.Sc**

**SUBJECT: ELECTRONICS**

**PAPER: III (PRACTICAL)**

**Note:** A candidate is required to perform minimum of 6 experiments in each section out of the list provided during course of study in odd and even semester in corresponding session.

**List of Practical:**

**Section-A**

1. Measurement of offset voltage, bias currents & CMRR of an operational amplifier.

2. Operational amplifier as (1) units gain buffer (I) inverting amplifier (3) Non-inverting amplifier.

3. Operational amplifier as (1) summing amplifier (2) difference amplifier.

4. To study & design Hartley oscillator & measure its frequency.

5. To study & design Colpitts oscillator & measure its frequency.

6. To study the design of phase shift oscillator & measure its frequency.

7. To study the condition for sustained oscillation for Wein bridge oscillator.

8. To study the working of Schmitt trigger using operational amplifier.

9. Study of characteristic of UJT.

10. To design saw tooth wave generator using UJT.

11. To design a transistorized Astable multivibrator and measure its frequency.

12. To study the operation of transistorized Monostable multivibrator circuit and measure its delay lime.

13. To study and design Astable multivibrator using IC 555.

14. To study and design Monostable multi vibrator using IC 555.

15. To study the frequency response of 1st and 2nd order active High pass filter & compare their result.

16. To study the frequency response of 1st and 2nd order active Low pass filter & compare their result.

17. Study of different type of IC’s: functions, pin diagram, block diagram of 741,555.

**Section-B**

1. Half adder/Full adder.

2. Multiplexer and Demultiplexer Circuit (4: 1)

3. JK, D &T Flip-Flops.

4. Divide by N Counter.

5. Shift register

6. DAC

7. Ripple binary counter.

8. Synchronous binary-counter.

9. Up. Down counter

10. ADC

11. Code Converter.

12. Parity generator

13. CMOS Decade Counter

14. Study of different type of IC’s: functions, pin diagram, block diagram of 7400, 7402, 7404,7408,7432,74153,74155,4001,4011,4081,4071,4077,4009.

**Note:**

* 1. The Practical examination will be held at the end of even semester in two sittings of three hours each with First sitting starting in the evening session of the first day and second sitting in the following morning session.
	2. A candidate is required to perform minimum of 6 experiments in each section out of the list provided during course of study in odd and even semester in corresponding session and is required to perform one experiment from each section in examination. Experiment from one section in First Sitting and experiment from other section in Second Sitting.
	3. Distribution of Marks :
		+ 1. Paper III – 100 Marks of 3+3 Hours duration
			2. Lab Record: 20
			3. Experiments: 20 + 20
			4. Viva/Voce : 20+20
1. Maximum 10 students in one group during course of study and also in Examination.
2. Work Load – 6 periods per week per group.