

# GUJARAT TECHNOLOGICAL UNIVERSITY

## DIPLOMA IN ELECTRICAL ENGINEERING

### Semester: 4

**Subject Name** FUNDAMENTALS OF ELECTRONIC CIRCUIT

| Sr.No | Course content  |
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| 1.    | <b>SINGLE PHASE RECTIFIER</b><br>1.1 Define rectifier, Explain Junction diode as a rectifier<br>1.2 Classification of 1-phase rectifiers-Circuit diagram, working, waveforms of <ul style="list-style-type: none"> <li>- 1-phase H.W rectifier Circuit</li> <li>- 1-phase F.W rectifier Circuit</li> <li>- 1-phase Bridge rectifier Circuit</li> </ul> 1.3 Derivation of (H.W & F.W/Bridge circuit) <ul style="list-style-type: none"> <li>- <math>I_{d.c}</math> (average value of current) &amp; <math>I_{rms}</math> (RMS value of current)</li> <li>- <math>E_{d.c}</math> (average value of output voltage), Form factor, Ripple factor</li> <li>- Peak inverse voltage (PIV)</li> </ul> 1.4 Filter circuit & types of filter circuit <ul style="list-style-type: none"> <li>- simple capacitor filter circuit</li> <li>- Simple inductor filter circuit</li> <li>- L input filter circuit</li> <li>- C input filter circuit</li> <li>- input filter circuit</li> </ul> 1.5 Applications of rectifier circuit<br>1.6 Battery eliminator circuit using bridge module. |
| 2.    | <b>REGULATED POWER SUPPLY (RPS)</b><br>2.1 Draw a block diagram of RPS -working of each block -Explain the change in output voltage due to variation of input voltage & load current<br>2.2 Define (only) <ul style="list-style-type: none"> <li>- stabilization factor</li> <li>- output impedance</li> <li>- current regulation</li> <li>- load regulation</li> </ul> 2.3 Types of voltage regulators<br>Explain circuit, working of- <ul style="list-style-type: none"> <li>- zener voltage regulator</li> <li>- shunt regulator</li> <li>- Series regulator</li> </ul> 2.4 RPS -using series regulator circuit <ul style="list-style-type: none"> <li>- using Shunt regulator circuit</li> </ul> 2.5 Variable voltage RPS with feedback series type circuit<br>2.6 Three terminal fixed voltage regulated IC -It's circuit diagram & working<br>2.7 SMPS  |
| 3.    | <b>VOLTAGE AMPLIFIERS</b><br>3.1 Basic action of amplifier(C-E treatment) - Define amplifier, Gain of amplifier<br>3.2 Classification of amplifier<br>3.3 Voltage amplifier <ul style="list-style-type: none"> <li>- C.E amplifier working</li> </ul>   |

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|    | <ul style="list-style-type: none"> <li>- define voltage gain, neper, decibel &amp; it's relation</li> </ul> <p>3.4 Cascading of amplifier</p> <ul style="list-style-type: none"> <li>-need for cascading</li> <li>-methods of cascading</li> <li>-R-C coupled</li> <li>-Transformer coupled</li> <li>-L-C coupled</li> <li>-direct coupled</li> <li>-merits &amp; demerits of above method</li> <li>-Resultant gain of 3-state amplifier</li> </ul> <p>3.5 D.C &amp; A.C load line</p> <ul style="list-style-type: none"> <li>-procedure for drawing load line</li> <li>-define operating point 'Q'</li> <li>-find Q point on load line</li> </ul> <p>3.6 Biasing of a transistor - need for biasing (give reason) -method of biasing</p> <ul style="list-style-type: none"> <li>-fixed battery method</li> <li>-emitter resistances method</li> <li>-potential divider method</li> </ul> <p>3.7 Equivalent circuit for C-E amplifier using h-parameters-</p> <ul style="list-style-type: none"> <li>-write expression only for -Input impedance, current gain, voltage gain, power gain, output impedance</li> </ul> <p>3.8 R-C coupled amplifier -circuit diagram, working, frequency response, bandwidth,</p> <p>3.9 Tuned Amplifier -circuit &amp; working of -single tuned amplifier, double tuned amplifier, staggered tuned amplifier</p> <p>3.10 Explain Neutralization</p> <p>3.11 Feedback amplifiers</p> <ul style="list-style-type: none"> <li>-Block diagram treatment, Expression of gain with negative feedback, merits &amp; demerits</li> </ul> <p>3.12 Direct coupled amplifiers</p> <ul style="list-style-type: none"> <li>-circuit diagram &amp; working of differential amplifier</li> </ul> <p>3.13 Operational amplifier -pin connection diagram of op-amp IC 741, characteristics of op-amp, Applications, circuit diagram, working &amp; properties of Emitter Follower</p> |
| 4. | <p><b>POWER AMPLIFIER</b></p> <p>4.1 Concept of power amplifier -explain large signal amplifier -difference between voltage amplifier &amp; power amplifier</p> <p>4.2 Classification of power amplifiers</p> <ul style="list-style-type: none"> <li>-on the basis of selection of operating point</li> <li>-class A, class B , class AB, class C operation of amplifier</li> <li>-comparison of above amplifiers</li> </ul> <p>4.3 Push pull amplifier</p> <ul style="list-style-type: none"> <li>-circuit diagram, working ,advantages of push pull amplifier</li> <li>-complimentary push pull amplifier</li> </ul> <p>4.4 Phenomena of Thermal runaway of transistor</p> <ul style="list-style-type: none"> <li>-meaning of thermal runaway</li> <li>-How heat sink prevents thermal runaway of transistor</li> <li>-power de rating curve of power amplifier</li> </ul> <p>4.5 Circuit of power amplifier using IC TBA 810</p>  |
| 5. | <p><b>OSCILLATORS</b></p> <p>5.1 Oscillator-block diagram treatment, definition ,applications ,classification</p> <p>5.2 Requirement for oscillation- explain damped oscillation</p> <p>5.3 positive feedback amplifier as an oscillator,state baekhausen criterion for sustained oscillation, essential requirement of an oscillator</p>  |

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|    | <p>5.4 L-C Oscillators -Circuit diagram &amp; working of-Hartely &amp; colpitt's oscillator, -compute frequency of oscillation</p> <p>5.5 R-C oscillators, -R-c Phase shift oscillator, circuit, working, Expression only for minimum value of Gain of an amplifier of Gain of an amplifier</p> <p>5.6 Wien bridge Oscillator-Block diagram Treatment-How zero shift is obtained-expression for frequency of oscillation</p> <p>5.7 Crystal oscillator -explain piezoelectric effect &amp; equivalent circuit of crystal-Circuit diagram&amp; working of crystal oscillator using FET</p> <p>5.8 Multivibrators-Circuit diagram &amp; brief explanation of-<br/>-Astable multivibrator, monostable multivibrator, bistable multivibrator<br/>-expression for "ON" time &amp; "OFF" time and frequency of oscillation</p> <p>5.9 Non sinusoidal oscillators -circuit diagram, working, waveforms and applications of-<br/>-Schmitt trigger circuit, blocking oscillator, saw tooth generator</p> |
| 6. | <p><b>ELECTRONIC TEST INSTRUMENTS</b></p> <p>6.1 Digital multimeter -block diagram,front panel layout, specifications, Advantages of multimeter</p> <p>6.2 Demonstration to measure/check the given quantity/functions</p> <p>6.3 AF &amp; RF Signal Generator- Block diagram, front panel layout, specifications &amp; applications</p> <p>6.4 CATHODE RAY OSCILLOSCOPE (CRO)<br/>-Give brief introduction about CRT<br/>-Block diagram of CRO<br/>-Front panel layout<br/>-front panel controls &amp; their function<br/>- Applications of CRO<br/>-to measure current, dc voltage, ac voltage, frequency, resistance, phase difference<br/>-Lissajous Pattern to measure frequency<br/>-Hysteresis loop measurement</p>  |
| 7. | <p><b>SIMPLE CIRCUITS USING IC</b></p> <p>7.1 Linear ICs<br/>-classification of linear ICs<br/>-important features of linear ICs<br/>-Block diagram of op-amp IC 741<br/>-specifications of IC 741</p> <p>7.2 Applications of IC 741-Draw connection diagram &amp; explain working of unity gain amplifier, integrator, differentiator, voltage comparator, clipping amplifier</p> <p>7.3 Voltage regulator ICs -Block diagram and function of each block of<br/>-three terminal fixed voltage regulator IC(78-- &amp; 79—series)<br/>-variable voltage regulator IC(IC 723 &amp; LM—series)</p> <p>7.4 Timer ICs -block diagram &amp; pin diagram of IC 555<br/>IC 555 as--monostable mode, astable mode &amp; bistable mode<br/>- 4 stage sequence timer circuit &amp; it's working<br/>-pin diagram-m of IC 556(double timer IC)<br/>- 4 stage sequence timer circuit &amp; it's working</p>   |

## **Reference Books:**

- 1 Principle of Electronics by V K Mehta
- 2 Electronics devices & circuit by Allen Mottershed
- 3 Principle of Electronics by Malvino
- 4 Basic electronics & linear circuits by Bhargav, Kulsreshtha, Gupta
- 5 Op-amp 741 & IC 555 projects by BPB