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| <b>SEMESTER</b><br><i>Fifth</i>  | <b>DEPARTMENT</b><br><i>Telecommunications Engineering</i> | <b>COURSE TITLE</b><br><i>Analog Electronics III</i>       |
| <b>COURSE CODE</b><br><i>ET502</i>   | <b>HOURS: 3</b><br><b>UNITS: 3</b>                         | <b>COURSE SPECIFICATIONS</b><br><i>Theoretical Content</i> |
| <b>1. Passive and Active Filters using operational amplifier:</b> <ul style="list-style-type: none"> <li>➤ Description of basic concept of filters and the characteristics of ideal filters.</li> <li>➤ Difference between passive and active filters.</li> <li>➤ Frequency response, cut-off frequency and bandwidth of filters.</li> <li>➤ Types of passive filters (RC-RL low pass filter and RC-RL high pass filter).</li> <li>➤ Types of active filters.</li> </ul>   |  |  |
| <b>2. Waveform Generator and Sinusoidal Oscillator Circuits using operational amplifier:</b> <ul style="list-style-type: none"> <li>➤ Voltage comparators (Hysteresis and Schmitt triggers).</li> <li>➤ Multivibrators and wave shaping.</li> <li>➤ Theory of sinusoidal oscillation.</li> <li>➤ Phase shift oscillator.</li> <li>➤ Wien bridge oscillators and LC oscillators (Colpitts and Hartly oscillators).</li> <li>➤ Crystal oscillator.</li> <li>➤ Square wave generator.</li> <li>➤ Triangular generator.</li> </ul> |  |  |
| <b>3. Phase-locked loop (PLL):</b> <ul style="list-style-type: none"> <li>➤ Concept of Voltage-Controlled Oscillator (VCO).</li> <li>➤ Component of PLL and its parameters.</li> <li>➤ Types of PLL.</li> <li>➤ Applications of PLL.</li> </ul>  |  |  |
| <b>4. Voltage Regulators:</b> <ul style="list-style-type: none"> <li>➤ Types of voltage regulators.</li> <li>➤ Using transistors and operational amplifiers in series voltage regulators.</li> <li>➤ Using transistors and operational amplifiers in shunt voltage regulators.</li> <li>➤ Protection for voltage regulators.</li> </ul>  |  |  |

- Types of IC voltage regulators.

#### **5. Switched-Mode Power Supplies:**

- Operation of modern switched-type power supply.
- Switching regulator data sheets.

#### **6. Semiconductor Switches:**

- Four-layer semiconductor devices
- Schottky diodes and Thyristors.
- The use Diacs and Triacs in power control circuits

#### **References:**

1. Ronald J. Tocci, *Fundamentals of Electronic Devices*, Charles E. Merrill Publishing.
2. Theodore F. Bogart, *Electronic Devices and Circuits*, Prentice-Hall.
3. Ralph J. Smith, *Circuits, Devices and Systems*, John Wiley.
4. Jacob Millman and Arvin Grabel, *Microelectronics*, McGraw Hill.
5. Micheal Jacob, *Applications and Design with Analog Integrated Circuits*, Prentice Hall.
6. أساسيات الإلكترونيات، تأليف: أي إن لورج، تعريب معن محمد شاكر.
7. Paul B. Zbar, *Basic Electronics*, McGraw-Hill Book Company.
8. Paul B. Zbar, *Industrial Electronics; A text-lab manual*, McGraw-Hill book company
9. Horwitz and Robinson, *Laboratory manual for the art of electronics*, Cambridge University Press.
10. Phillip Cutler, *Linear Electronic Circuits with Illustrative Problems*, McGraw-Hill Inc.