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<th>S. No</th>
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L : Lecture hours ; T : Tutorial hours, P : Practical hours  
ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment ;

Note : **One month Industrial Training will be organized after 4th semester examination and it's evaluation will be done in 5th semester.**
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

A) SEMESTER : IV
B) SUBJECT TITLE : INDUSTRIAL MANAGEMENT
C) CODE : 200415 (37)
D) BRANCH/DISCIPLINE : Electronics & Tele-communication
E) RATIONALE : Student has been earmarked for this course since the shop floor provides majority of the opportunity available for employment & many diploma pass outs are engaged in shop floor supervisory work. Hence it has been found necessary to impart information related to the concepts, principles, procedures and ‘understanding’ of management techniques so that the student is brought to fairly high level of competency in ‘supervision’.

The course is introduced through a chapter on ‘Systems Thinking’. It is felt that considerable time is spent in identification and alternative solution selection when a young engineer encounters problematic situations on the shop floor. A systematic frame of thinking and a proper problem-solving attitude is required to with these situations. The course comprises of two major parts, one is of ‘Behavioral Science’ where the students are exposed to the principles of Group behavior, which will help them to deal with worker’s psychology, their motivation level, and finally an idea of how communication transfer is effected form the highest to lowest level. The second face deals with the ‘Mathematical Approach towards Management’, which comprises of Modern management concepts like CPM and PERT value Analysis, Inventory control, economic batch size determination and operation-research. It is hoped that this course will evoke considerable interest in the diploma students and will help to get jobs earlier.

F) TEACHING AND EXAMINATION SCHEME:

<table>
<thead>
<tr>
<th>Course Code</th>
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ESE – End of Semester Exam.; CT – Class Test; TA- Teacher’s Assessment
G) SUGGESTED DISTRIBUTION OF MARKS AND HOURS:

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<th>Chapter No.</th>
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<th>Hours</th>
<th>Marks</th>
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<tr>
<td>1</td>
<td>1</td>
<td>Management &amp; System Thinking Concepts</td>
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<td>Materials Management</td>
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<td>Production Planning And Control.</td>
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<tr>
<td>4</td>
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<td>Project Planning Using Network Techniques</td>
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<td>Industrial Relations</td>
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<td>Supervision And Leadership</td>
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<td>7</td>
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<td>Operation Research</td>
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<td>9</td>
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<td>Planning &amp; Preparing A Project Report</td>
<td>6</td>
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<td>10</td>
<td>10</td>
<td>Value Analysis &amp; Computers In Management</td>
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H) DETAILED COURSE CONTENTS:

**Chapter- 1: Management & System Thinking Concepts:**
- Definition, activities.
- Theories-Decision, Quantitative, Mathematical, Behavioral Sciences.
- System definition and parameters,
- Production system, Non-production system and objectives,
- System design, procedure, system variables,
- Different types of model under system thinking.

**Chapter- 2: Materials Management:**
- Introduction & function of purchase system,
- Inventory, need & advantages of Inventory control
- Different techniques of Inventory control - A.B.C. analysis, simple treatment only.
- Correlation, stock turn over, order quantity, Lead time purchase cycle,
- Economic order Quantity, simple numerical problems, Safety stock
- Stores Management-Definition and importance, Storing Procedure and store records.

**Chapter- 3: Production Planning And Control:**
- Production system, concept of planning, meaning of PPC,
- Classification & characteristics of each type,
- Function of & place of PPC in a organization,
- Production and consumption rate,
- Job, Batch and Mass production,
- Batch size, Buffer stock, Production cost components,
- Concept of production scheduling. Difference between Loading & Scheduling,
- Gantt chart scheduling, advantages and preparation of GANTT chart,
- Interpretation updating, critical ratio scheduling.
Chapter 4: Project Planning Using Network Techniques:

- Network—meaning & objectives,
- Network formation, representation of activities and event on network, rules for drawing network diagram, Fullerson’s rule,
- Different techniques-PERT & CPM.,
- Dependency of activities, Dummy activities,
- Different Time estimates- Optimistic, Pessimistic & Most likely Time, ET, LT, EST, LST, LCT, ECT, Floats & Slacks and Network analysis on tabular form,
- Updating of Network, control through updating.
- Main power loading and calculation on load smoothing.

Chapter 5: Industrial Relations:

- Scope, definition, need, objective and function of personnel management.
- Job analysis, Job description and its constituents,
- Man power as resources, recruitment, selection, training and terminal behavior in an organization,
- Communication in Industry its need and importance,
- Classification, technique and barriers in communication and their effects
- Grievances, its meaning, factors responsible for grievances, process and condition for handling of grievances,
- Strikes and lockouts, conditions, conciliation and adjudication machinery
- Motivation, meaning and its benefits, factors responsible for lack of motivation, techniques to boost the motivation in workers,
- Job satisfaction, social and economic values, factors influencing job satisfaction.

Chapter 6: Supervision And Leadership:

- Meaning and Role of supervisor in an industry,
- Need of supervision, older workers and their supervision,
- Concept of leadership, Qualities of a good leader
- Effectiveness of leadership system

Chapter 7: Organisational Dynamics:

- Organization structure, characteristic and principle of organization
- Modern organization approach,
- Types of organization, meaning and signification of various types,
- Organization change, resistance to change, employee’s attitude, factors for reducing the resistance to change.

Chapter 8: Operation Research:

- Definition and concept & methods of Operation Research.,
- Linear programming-problem formulation and Graphical methods
- Simplex method of linear programming.

Chapter 9: Planning and Preparing a Project Report:
Selection of project, Scheduling of activities involved, Model format,
Project planning, preparation of action plan for implementation, preparation of project,
Cases: - illustrate some real cases, the students are advised to
1. Visit few small-scale industries situated in the city, near by industrial area.
2. Discuss the problem related to S.S.I. with entrepreneurs.
3. Collect information about the market rates, quality & quantity of goods of their choice.
4. Develop logical & analytical approach to purchase the raw material, finished good.
5. Prepare project report for the industry, they are willing to start.

Chapter-10: Value Analysis & Computers in Management
Concept of Cost and Concept of value,
Objectives, components and types of value,
V.A. procedure and V.A. Test. DAR SIRI method, value improvement procedures.
Role of computers in management, introduction to computer system, Personal computer and its uses-introduction to management information system (MIS).

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

Lecture Method:
- Teaching through chalk board
- Interaction with students through seminar.
- As far as possible concepts are to be visualized by extensive use of charts models

Industrial Visits:
Visits to nearby industries to expose them to industrial environment, their working, ways of written & verbal communications, their team working & decision-making styles, problem solving strategies, computer usage in different aspects of industrial work, Industrial relations and material management methods.

Expert Lecturer:
- Expert lecturer as to be arranged on above subject through guest faculty.

Demonstration:

J) SUGGESTED LEARNING RESOURCES.
(a) Reference Books:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title</th>
<th>Author, Publisher, Edition &amp; Year</th>
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<tbody>
<tr>
<td>2.</td>
<td>CPM and FERT- Principles and Application.</td>
<td>L.S. Srinath.</td>
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<td>4.</td>
<td>Essentials of Management</td>
<td>Kuntz , Mcgraw Hill.</td>
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<td>5.</td>
<td>Industrial Engineering and Management</td>
<td>O.P. Khanna.</td>
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<td>6.</td>
<td>Industrial organization and management</td>
<td>Ahuja.</td>
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<td>7.</td>
<td>Value Analysis</td>
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<td>13.</td>
<td>Project Engineering and Management</td>
<td>A.K.Sinha &amp; Rama Sinha</td>
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</table>

(b) Others:

- VCD’s
- Learning Packages through CD
  - Charts
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

A) SEMESTER : IV
B) SUBJECT TITLE : ANALOG ELECTRONICS
C) CODE : 228412 (28)
D) BRANCH/DISCIPLINE : Electronics & Tele-communication
E) RATIONALE : This Course deals with the analog components and ICs used for Industrial Applications such as automation, PLC, technology, AC and DC Drives. The functional behaviors and typical circuits using analog devices are greatly emphasized. After going through this course, the students will be able to develop understanding of all typical circuits using analog devices / ICs and to generate the skills to use such circuits which are widely used in Automation and Communication industries.

F) TEACHING AND EXMINATION SCHEME:

<table>
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<tr>
<th>Course Code</th>
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L : Lecture hours ; T : Tutorial hours, P : Practical hours
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G) DISTRIBUTION OF MARKS AND HOURS:

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<th>Sl. No.</th>
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<td>1</td>
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<td>Introduction to OPAMPS</td>
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<td>Analog signal conditioning</td>
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<td>3</td>
<td>3</td>
<td>Comparators &amp; converters</td>
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<td>Voltage regulators</td>
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<td>Special application circuits</td>
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H) DETAILED COURSE CONTENTS:

Chapter – 1 : Introduction to OP-AMPS
☞ Working principle of basic differential amplifier, characteristics of differential amplifier, Different modes of operation
☞ OP-AMPS- IC configuration, characteristics, parameters, block diagram, functions of each block, various IC packages, pin configurations of OP-AMPs Ics, ideal characteristics of an OP-AMPS, features of data sheet
Electrical parameters- input offset voltage, input resistance, CMRR, slew rate, gain, bandwidth

Negative feedback amplifiers.

Chapter – 2 : Analog signal conditioning

Linear application- principle of analog signal conditioning circuits used for linear application, inverting and non-inverting amplifiers, OP-AMP as voltage follower, OP-AMP as adder, OP-AMP as subtractor, OP-AMP as integrator, OP-AMP as differentiator, I to V converter and V to I converter, scaling amplifiers, AC/DC amplifiers, difference between AC/DC amplifier

Non-linear applications- principle, features and use of OP-Amps circuits
1. Instrumentation amplifier- circuit diagram of instrumentation amplifier and its working
2. Sample/hold circuit- need of sample/hold circuit, explanation of circuit
3. Precision rectifiers- significance of Precision rectifiers, working of Precision rectifiers
4. Active filters- meaning of active filters, classification of active filters as low pass; high pass and band pass, circuits of LPF, HPF and BPF

Chapter – 3 : comparators and converters

Comparators
- Mode of operation, characteristics and applications
- Functions of a comparator
- Zero crossing detectors
- Schmitt trigger; Threshold voltage, Hysteresis curve
- Oscillators; wein bridge, phase shift, relaxation

Converters-
- Voltage to frequency converter; basic principle and its circuit diagram
- Frequency to voltage converter; basic principle and its circuit diagram
- A/D Convertors; basic principle & circuit diagram
- D/A Convertors; basic principle & circuit diagram

Chapter – 4 : Voltage regulators

Need of regulator, monolithic voltage regulator and its pin, regulator ICs like; 723, 78XX and other LMXXX series ( special features)

Basic low and high voltage regulators

Applications of 3-pin regulators

Chapter – 5 : Special applications circuits

Timers – introduction to 555 timer, functional block diagram of timer, operating modes as mono, bi and astable, 555 as wave generators like; square, saw tooth and triangle, pulse width and duty cycle of a pulse signal, working of a wave generation circuit, pin diagram & implementation.

PLL- block diagram of PLL, lock and capture range, PLL transfer characteristics & its significance, types of PLL and its applications.

I) SUGGESTED INSTRUCTIONAL STRATEGIES:
A good practice and exercise is required to enable students to have complete knowledge on the subject and various measurement techniques.

### J) SUGGESTED LEARNING RESOURCES.

(a) **Reference Books:**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title</th>
<th>Author, Publisher, Edition &amp; Year</th>
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<tbody>
<tr>
<td>1</td>
<td>Users Manual linear IC Trainer HIL 2941</td>
<td>HCL limited</td>
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<td>2</td>
<td>Operational Amplifiers and linear ICs</td>
<td>By R.F. Coughlin/F.F. Driscall (PHI)</td>
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<td>3</td>
<td>Op-Amps and linear ICs Publisher</td>
<td>R.A. Gayakward Hall Indian Ltd. New Delhi, 3rd, 1987</td>
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<td>Siemens trainer manuals</td>
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<td>Micro - Electronics</td>
<td>Millman (TMH), New Delhi, 2nd, 1990</td>
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<td>OP-AMP</td>
<td>Graeme &amp; Toby, Wiley Eastern, New York, 2nd, 1980</td>
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(b) **Others:**

- VCDs.
- Learning Packages.
- Lab Manuals.
- Charts.

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**Course: Analog Electronics, Lab**

**CODE : 228421 (28)**

**Hours: 32**

**LIST OF PRACTICALS / TUTORIALS:**

1. Measurement of Different Characteristics of an OP-AMP loop configuration
   (a) Output resistance “Ro”
   (b) Diff. Input Resistance “Ri”

   (a) Voltage Gain
   (b) Unity Gain Bandwidth
(3) Measurement of Differential Characteristics of an OP-AMP
   (a) Input offset voltage

(4) Offset Nullification with:
   (a) External Biasing for Inverting OP-AMP
   (b) External Biasing for Non-Inverting OP-AMP

(5) Inverting Amplifier
   (a) AC Analysis
   (b) DC Analysis
   (c) Unity Gain

(6) Non-Inverting Amplifier
   (a) AC Analysis
   (b) DC Analysis
   (c) Unity Gain Buffer

(7) OP-AMP as:
   (a) Adder
   (b) Subtractor
   (c) Multiplier
   (d) Divider

(8) OP-AMP as:
   (a) Integrator
   (b) Differentiator
   (c) Inverter
   (d) Buffer

(9) OP-AMP as Active Filter:
   (a) Low pass filter
   (b) High pass filter
   (c) Band pass filter

(10) Wave- shaping:
    (a) Astable Multivibrator using OP-AMP
    (b) Astable Multivibrator using Timer IC.
    (c) Monostable multivibrator using timer IC.

(11) Signal generator using OP-AMP / Timer IC
    (a) Triangular wave generator

(12) Schmitt Trigger. OP-AMP and Timer IC
    (a) Saw tooth wave generator
(b) Ramp generator

(13) Preparation of Adjustable timer using OP-AMP

(14) Oscillator using OP-AMP:
   (a) Wein Bridge Oscillator
   (b) R.C. Phase Shift Oscillator.

(15) Clamper and chopper operation
   (a) Positive and Negative clamper
   (b) Positive and Negative clipping

(16) Sample and Hold circuit operation

(17) Precision Rectifier using an OP-AMP and voltage regulations.

(18) Measurement VCD sensitivity linearity & free running frequency.

(19) Phase lock loop as frequency multiplier.

(20) Calculate the duty cycle of PWM.

(21) 4 bit D/A converter addition experiments.

(22) A/D Converter.

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CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

A) SEMESTER : IV
B) SUBJECT TITLE : PRINCIPLES OF COMMUNICATION
C) CODE : 228413 (28)
D) BRANCH/DISCIPLINE : Electronics & Tele-communication
E) RATIONALE : The knowledge of the basic principles and procedures used in electronic telecommunications will equip the students for lateral and vertical mobility when he/she enters the field of work. Concepts such as modulations, transmitters, receivers, basic telephony, advance telephony, modern trunk dialing and exchange that are widely used in the field of communications are dealt in this course.

F) TEACHING AND EXMINATION SCHEME:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Periods/Week (In Hours) (Teaching Scheme)</th>
<th>Scheme of Examination</th>
<th>Credit L+(T+P)²</th>
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<tr>
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<td>Communication System</td>
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<td>Amplitude &amp; Frequency modulation</td>
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<td>Radio receiver &amp; Transmitter</td>
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</table>

H) DETAILED COURSE CONTENTS:

**Chapter – 1** : Communication System
- Information, Transmitter, Channel, Noise, Receiver, Modulation, Need of Modulation, Bandwidth Requirements, External Noise, Internal Noise, Noise Figure, S/N ratio.

**Chapter – 2 Amplitude & Frequency Modulation**
- Generation & Description, Representation, Frequency Spectrum, Demodulation, Pre-emphasis & De-emphasis in FM, SSB & DSB, Simple Numerical

**Chapter – 3** : Radio Receiver & Transmitter :
Radio Receiver types: Tuned radio frequency, Superhetreodyne Receiver
AM Receivers: RF section & characteristics, frequency changing & tracking, intermediate frequency & IF amplifier, detection & automatic gain control, Simple Numerical
FM Receivers: Block diagram, amplitude limiters, basic FM demodulator, radio detector, radio transmitter block diagram description.

Chapter – 4: Pulse Modulation:
Pulse modulation: Introduction types, Sampling theorem & nyquist rate,
Pulse Amplitude modulation (PAM), Pulse Width modulation (PWM), Pulse Position modulation (PPM) Generation & demodulation.
Pulse Code modulation (PCM), Quantization, Generation, demodulation, effects of noise, companding, Advantages & application
Multiplexing: Time division multiplexing (TDM) & Frequency Division multiplexing (FDM)

Chapter – 5: Telephony:
☞ Concept of telephony, pulse & tone device like push button telephones KTS, EPABX, FAX machine moderns, brief description of devices, construction & working. Switching
☞ Time and space switches (elementary idea). CLIP, CALL FORWARD, CALL, WAITING, distinctive ring facilities how they are offered & processed in modern telephony basic circuits used to clip & provide call features. CDOT, common features.
☞ STD, ISD, voice calls processed by internet packages like net phone, PC to voice etc., monitoring of calls through PCO billing monitors,

Chapter 6: Troubleshooting
Troubleshooting of Radio receiver, Alignment & tracking of various stages of a radio receiver (AM & FM).
Troubleshooting of Telephone handset.
Troubleshooting of EPBX

G. SUGGESTED INSTRUCTIONAL STRATEGIES:
☞ Lecture session with question and answer
☞ Use of audio visual aids
☞ Assignments on various topics
☞ Expert Lecture session from industry.
☞ Troubleshooting exercises
☞ Home assignment

G. SUGGESTED LEARNING RESOURCES.

(e) Reference Books:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title</th>
<th>Author, Publisher, Edition &amp; Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication system</td>
<td>Singh &amp; Sapre,</td>
</tr>
<tr>
<td>3</td>
<td>Principles of telephony</td>
<td>N.N. Biswas</td>
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<td>4</td>
<td>Automatic Telephony</td>
<td>P.N. Das</td>
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<tr>
<td>5</td>
<td>Communication systems</td>
<td>Ahirrao D.D. &amp; Jadhav N.S., Everest Publications Pune</td>
</tr>
<tr>
<td>6</td>
<td>Communication systems</td>
<td>George Kennedy</td>
</tr>
</tbody>
</table>
Course: Principles of Communication, Lab

CODE: 228422 (28)
Hours: 32

LIST OF PRACTICALS / TUTORIALS:

1. Perform amplitude modulation of a signal, plot the waveform and calculate modulation index
2. Perform frequency modulation of a signal and trace the frequency modulated waveform from CRO
3. Perform phase modulation of a signal and trace the phase modulated waveforms from CRO
4. Perform signal sampling and reconstruction techniques
5. Perform the TDM pulse amplitude modulation/demodulation & draw their waveform in the graph
6. Perform the division multiplexing pulse code modulation/demodulation
7. Perform the delta modulation techniques and plot the waveforms
8. Perform the adaptive delta modulation techniques and plot the waveforms
9. Perform the modulation & demodulation in ASK, draw its waveforms
10. Perform the modulation & demodulation in FSK, draw its waveforms
11. Perform the modulation & demodulation in PSK, draw its waveforms
12. Observe DSB/SSB AM transmitter waveforms and plot the graph
13. Observe DSB/SSB AM receiver waveforms and plot the graph
14. Study of EPABX machine
15. Study of FAX machine
16. Identify the various blocks & components of EPABX using a EPABX trainer
17. visit to telephone exchange
18. visit to mobile telephone exchange

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI
A) SEMESTER : IV
B) SUBJECT TITLE : POWER ELECTRONICS
C) CODE : 200414 (28)
D) BRANCH/DISCIPLINE : Electronics & Tele-communication
E) RATIONALE : Power electronics is a subject that concerns the applications of electronic principles in to situation that are rated at power level rather than signal level. Many semiconductor devices such as SCR, DIAC, TRIAC, MOSFET and transistors are available for power applications. An effort is made in this course to provide understanding of the various power electronics applications to enable the students to acquire some core skills related to power electronics.

F) TEACHING AND EXMINATION SCHEME:

| Course Code | Periods/Week (In Hours) (Teaching Scheme) | Scheme of Examination | Credit [L+(T+P)]
|-------------|------------------------------------------|-----------------------|----------------
<table>
<thead>
<tr>
<th>L</th>
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</tbody>
</table>

L : Lecture hours : T : Tutorial hours, P : Practical hours
ESE – End of Semester Exam; CT – Class Test; TA- Teacher’s Assessment

G) DISTRIBUTION OF MARKS AND HOURS:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Chapter No.</th>
<th>Chapter Name</th>
<th>Hours</th>
<th>Marks</th>
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<tbody>
<tr>
<td>1</td>
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<td>Power electronics devices</td>
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<td>2</td>
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<td>Phase Controlled Rectifier</td>
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<td>3</td>
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<td>Commutation Techniques</td>
<td>12</td>
<td>15</td>
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<td>4</td>
<td>4</td>
<td>Chopper</td>
<td>10</td>
<td>12</td>
</tr>
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<td>5</td>
<td>5</td>
<td>Invertors and UPS</td>
<td>12</td>
<td>15</td>
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<tr>
<td>6</td>
<td>6</td>
<td>AC voltage controller</td>
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<td>Cycloconverter</td>
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<td>Total</td>
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</table>

H) DETAILED COURSE CONTENTS:
Chapter – 1 : Power electronics devices
☞ Introduction to thyristor family
☞ Use of data book
☞ Construction, working principle, symbol, characteristics and applications of SCR, UJT, DIAC, TRIAC, PUT, LASCR, IGBT, GTO
☞ Triggering methods, turn on- turn off characteristics of SCR, di/dt rating, dv/dt rating, Protection against dv/ dt, over voltage & over current protection, necessity of series and parallel combination & string efficiency of combination, firing circuit,

Chapter – 2 : Phase Controlled Rectifier
☞ Half wave & full wave rectifiers, phase controlled Rectifier with R, RL& RL with free wheeling diode load., 3 phase half wave & full wave rectifier with Resistive load.
☞ Dual Converter: Introduction, working principle and speed control of DC motor using phase controlled Rectifier.

Chapter – 3 : Commutation Techniques
☞ Types of commutation
☞ Natural commutation
☞ Forced commutation
☞ Series resonance/current commutation
☞ Voltage commutations
☞ Auxiliary thyristor for commutation
☞ External pulse commutation.

Chapter – 4 : Chopper
☞ Concepts of choppers
☞ Types of chopper circuit (A-type to E-type)
☞ Jones chopper circuit
☞ Morgon chopper circuit

Chapter – 5 : Invertors and UPS
☞ Working principle of inverter
☞ Inverter circuits using transistor and thyristor and their comparisons
☞ Series inverter using thyristor
☞ Parallel inverter using thyristor
☞ Use of pulses width modulation (PWM) circuit
☞ Concept of UPS
☞ Block diagram of UPS

Chapter – 6 : AC voltage controller
☞ Types of voltage controller with R and RL load.
☞ Speed control of AC motor using AC voltage controller.

Chapter – 7: Cycloconverter
☞ Operating principle of Cycloconverter
☞ Types of Cycloconverter
☞ 1phase to 1 phase Cycloconverter.
☞ 1phase to 3 phase Cycloconverter

I) SUGGESTED INSTRUCTIONAL STRATEGIES:
When teaching this course, the actual power electronic devices need to be brought to the class and demonstrated to the students. The OHP could be used to magnify the silhouettes of the various components so that the students develop an appreciation of the actual shape of the various components.

J) SUGGESTED LEARNING RESOURCES.

(e) Reference Books:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title</th>
<th>Author, Publisher, Edition &amp; Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Electronics</td>
<td>Dubey, G.K.,</td>
</tr>
<tr>
<td>2</td>
<td>Power Electronics</td>
<td>Ramamurthy</td>
</tr>
<tr>
<td>3</td>
<td>Power Electronics</td>
<td>Rashid, M.H., Prentice Hall of India, New Delhi, 1990</td>
</tr>
<tr>
<td>4</td>
<td>Power Electronics</td>
<td>Sen, P.C., Tata McGraw Hill, New Delhi, 1999</td>
</tr>
<tr>
<td>5</td>
<td>Thyristor Engineering</td>
<td>Berde, M.S. Khanna Pub., New Delhi, 1990</td>
</tr>
<tr>
<td>6</td>
<td>Power Electronics</td>
<td>Bimbhra, P.S., Khanna Pub., New Delhi, 1996</td>
</tr>
</tbody>
</table>

(f) Others:

- VCDs.
- Learning Packages.
- Lab Manuals.
- Charts.

Course: Power Electronics, Lab

CODE: 200423 (28)  
Hours: 32

LIST OF PRACTICALS / TUTORIALS:

1. Performance of thyristor, TRIAC & DIAC
2. Frequency calculation of pulse in UJT relaxation oscillator
3. Applications of TRIAC as AC load control
4. Performance of IGBT & GTO
5. Relaxation oscillator circuit using PUT
6. Design of snubber circuit
7. SCR commutating circuits
8. Chopper circuit using SCR
9. Parallel inverter using two thyristors
10. Study of Cycloconverter circuit using thyristors
11. Time delay relay circuit using UJT and thyristor
A) SEMESTER : IV  
B) COURSE : PROGRAMMING IN ‘C’  
C) CODE : 228415 (22)  
D) BRANCH/DISCIPLINE : Electronics & Tele-communication  
E) RATIONALE : This Course intends to develop programming skills in the students, using a popular structured programming language `C`. The students will learn the step-by-step procedure (i.e. Algorithm and flowcharting) in any program development process. The programming skills thus acquired using `C` language can be used in developing programs for the scientific, research and business purposes.

F) TEACHING AND EXAMINATION SCHEME

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Periods/Week (In Hours) (Teaching Scheme)</th>
<th>Scheme of Examination</th>
<th>Credit L+(T+P) (\frac{2}{2})</th>
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<td>- - - 50 10 60 1</td>
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</tbody>
</table>

L : Lecture hours ; T : Tutorial hours; P : Practical hours  
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G) DISTRIBUTION OF MARKS AND HOURS

<table>
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<th>Chapter Name</th>
<th>Hours</th>
<th>Marks</th>
</tr>
</thead>
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<td>1</td>
<td>Introduction To <code>C</code> Programming</td>
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<td>Operations &amp; Expression</td>
<td>4</td>
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</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Input &amp; Output Statements</td>
<td>4</td>
<td>12</td>
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<tr>
<td>4</td>
<td>4</td>
<td>Control Statements</td>
<td>8</td>
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<td>Control Loop Statements</td>
<td>10</td>
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<td>6</td>
<td>6</td>
<td>Arrays &amp; Strings</td>
<td>10</td>
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<td>Functions &amp; Micro</td>
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<td>Structure ,Union and Enumerations</td>
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<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
H) DETAILED CONTENT

Chapter – 1 : Introduction to `C' Programming
?? Introduction
   - History and features of C, Algorithms, Flowcharts, structured programming Concepts

Chapter – 2 : Operations & Expression
?? Character set of C
?? Operators and Expressions
   - Arithmetic, Relational, Logical assignment operators, variables, onstants, data types, expressions, data type conversion, key words, hierarchy of operators;

Chapter – 3 : Input & Output Statements
?? `C' Programme structure, Type declaration, Input and Output, (printf, scanf, getchar, putchar, getch, putch), Conversion specifiers in format control string, Library functions (Math functions)

Chapter – 4 : Control Statements
?? Unconditional branching: goto statement
?? Conditional branching statements: if statement, if- else, Nested if' Multiple branching statements: switch case statement.

Chapter – 5 : Control Loop Statements
?? Loop Statements: `for' statement, while statement, `do-while' statement, `break-continue' statement.

Chapter – 6 : Arrays & Strings
?? Arrays:
   - Concept of one dimensional, two dimensional and
   - Multi-dimensional array, array declaration, Array and initialization, operations on one and two-dimensional arrays.
?? String Manipulations
   - Strings, get, puts, string operations, string function (concatenation, comparison, length of a string).

Chapter – 7 : Functions And Macros
?? Library and User-Defined Functions
   - Concepts of library functions, user-defined
   - Functions, local and global variables, storage class,
   - Parameter passing mechanisms simples and Conditional Macros and Its expansions

Chapter – 7 : Structure, Union And Enumerations
?? Definition, Declaration and Implementations

Chapter – 8 : Pointers
?? Definition, Declaration and Implementations
I) SUGGESTED IMPLEMENTATION STRATEGIES

The teachers are expected to give assignments to develop programs to the students soon after the completion of the concerned topic. The number of assignment will depend upon the availability of time. Sample question on the topic covered can be given to the students to make the teaching/learning process more effective. The programs that the teachers give to the students either in the classroom or as a take home assignment can be problems related to the other Courses taught in the discipline, like from mathematics/physics/mechanics/fundamental of electrical engineering etc.

The program that will be developed by the students should be general, interactive and structured. At the completion of this course the students are expected to understand the syntax and semantic of ‘C’ Language and develop proficiency in programming skills.

J) SUGGESTED LEARNING RESOURCES

a) Reference Books

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Title</th>
<th>Author, Publisher &amp; Address, Edition, Year of Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Spirit of C</td>
<td>Mullish Cooper, Jaico Publishing House, 121, N.G. Road, Mumbai, 2000</td>
</tr>
</tbody>
</table>

b) Others:
- VCDs.
- Learning Packages.
- Lab Manuals.
- Charts.

Course: Programming in ‘C’, Lab
LIST OF EXPERIMENTS/ DEMONSTRATIONS

i. Assignment to prepare general algorithms and flow chart.

ii. Assignment to write character, operators symbols of C Language

iii. Assignment to identify valid and invalid variables, constants and expressions

iv. Programme based on Input/Output statements

v. Program based on Arithmetic expression

vi. Program based on Library functions

vii. A Program based on goto statement

viii. Two Programs based on `if' and `Nested if''

ix. Program based on `switch case' statement.

x. At least one program based on each:
   a. `for' statement
   b. `while' statement
   c. `do-while' statement
   d. break continue statement

xi. One program based on one dimensional array

xii. One program based on two dimensional array

xiii. Three programs based on string operations

xiv. Two programs based on functions.
A) SEMESTER : IV
B) SUBJECT TITLE : MINOR PROJECT
C) CODE : 228425 (28)
D) BRANCH/DISCIPLINE : Electronics & Tele-communication
E) RATIONALE : Minor project work is a consolidation of various small activities, which students have already performed during the preceding semesters. Therefore, the purpose of given minor nature project work is to integrate as many acquired task/skills as possible. This type of minor project work during the programme builds the confidence and ability to perform the major project work in final semester.

F) TEACHING AND EXMINATION SCHEME:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Periods/Week (In Hours) (Teaching Scheme)</th>
<th>Scheme of Examination</th>
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<td>3</td>
</tr>
</tbody>
</table>

L : Lecture hours ; T : Tutorial hours, P : Practical hours
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G) DETAILED MINOR PROJECT WORK CONTENTS:

Familiarisation of Various Electronic Components
- Read the value of resistance/capacitor by observing colour coding.
- Familiarise various electronic components like:
  - Semiconductors, SCR, Linear and digital IC’s, (pin identification of 555, 741, 723, 74 and 40 Series), Regulator IC’s.
- Use the data book to get the information of above mentioned components.

Testing of Electronic Components
- Test & measure various resistance by Multimeters.
- Measure the values of power capacitors and inductors by L.C.R. bridge.
- Use trainer, oscilloscope, function Generators and power supplies for basic Circuits (like Amplifiers, multi-vibrators Timing circuits etc.)
- Check digital and Linear IC’s on bread Board with the help of data book (use logic prob)

PCB Fabrication
- Introduction to PCB’s
- PCB’s. lay-out
- Photo Printing
- Dying
- Post baking
Etching
Protection of Copper track.
Mechanical operation
Assembling and soldering of components on PCB.

Designing and Preparation of Small Electronic project
Prepare the PCB of a project.
Fabricate cabinets.
Test the prepared project.
Demonstrate the function/working of the prepared project.

I) SUGGESTED INSTRUCTIONAL STRATEGIES:

a) Project could be performed by group of two to five students.
b) Project should integrate all problem statements, which could consist of practical skills, intellectual skills, interpersonal skills, market survey skills etc.
c) Monitoring the project at every stage.
d) Project guide should carry out progressive assessment for every stage of project.

J) SUGGESTED LEARNING RESOURCES

(g) Reference Books:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title</th>
<th>Author, Publisher, Edition &amp; Year</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>The Design and Drafting of Printed Circuit</td>
<td>Mr. Darryl Lindsey Bishop graphics</td>
</tr>
<tr>
<td>2</td>
<td>Printed Circuit Boards Design and Technology</td>
<td>Walter &amp; Bosszant STata Mc Graw Hill</td>
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<tr>
<td>3</td>
<td>Design suitable learning experiences for laboratory work and direct laboratory experiences to achieve specified aims – Competency-Based Self-Learning Module. No.4; REC-British Council India Project</td>
<td>Earnest, Joshua; Mathew, Susan S.; Srivastava, M.K.; Banthiya, N.K.; TTTI, Bhopal, 1999</td>
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