JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech. in MECHANICAL ENGINEERING (MECHATRONICS)

III YEAR LABS SYLLABUS (R18)
Applicable From 2018-19 Admitted Batch

MANUFACTURING PROCESS LAB

B.Tech. III Year MT - I Sem.

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Minimum of 10 Exercises need to be performed

I. Metal Casting Lab:
1. Pattern Design and making - for one casting
2. Sand properties testing - Exercise -for strengths, and permeability –1
3. Moulding Melting and Casting – 1 Exercise

II. Welding Lab:
1. ARC Welding Lap & Butt Joint – 2 Exercises
2. Spot Welding – 1 Exercise
3. TIG Welding – 1 Exercise
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III. Mechanical Press Working:
1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending and other operations

IV. Processing Of Plastics
1. Injection Moulding
2. Blow Moulding

MACHINE TOOLS LAB

B.Tech. III Year MT - I Sem.

L T P C
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Course Objectives:
- To import practical exposure to the Machine tools
- To conduct experiments and understand the working of the same.

Any 8 of the following experiments

List of Experiments:
1. Introduction of general-purpose machines -Lathe, drilling machine, Milling machine, Shaper Planing machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on –lathe machine
4. Drilling and Tapping
5. Shaping and Planning
6. Slotting
7. Milling
8. Cylindrical Surface Grinding
9. Grinding of Tool angles

CAD/CAM & INSTRUMENTATION AND CONTROL SYSTEMS LAB

B.Tech. III Year MT - I Sem.　　　　　　　　　　　　　　　　　　**L　T　P　C**
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Course Objectives: To be able to understand and handle design problems in a systematic manner. To be able to apply CAD in real life applications. To be understand the basic principles of different types of analysis.

Course Outcomes: To understand the analysis of various aspects in of manufacturing design.

Note: Conduct any five exercises from the following:

(A) CAD/CAM LAB:
1. Drafting: Development of part drawings for various components in the form of orthographic and isometric. Representation of dimensioning and tolerances.
2. Part Modeling: Generation of various 3D Models through Protrusion, revolve, sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling and Assembly Modeling. Study of various standard Translators. Design of simple components.
3. Determination of deflection and stresses in 2D and 3D trusses and beams.
4. Determination of deflections, principal and Von-mises stresses in plane stress, plane strain and Axi-symmetric components.
5. Determination of stresses in3D and shell structures (at least one example in each case)
6. Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
7. Study state heat transfer analysis of plane and axi symmetric components.

(B) INSTRUMENTATION AND CONTROL SYSTEMS LAB

Pre-requisites: Basic principles of Instrumentation and control systems

Course Outcomes: At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.

Any 8 of the following experiments
1. Measurement and control of Pressure of a process using SCADA system.
2. Study and calibration of LVDT transducer for displacement measurement.
3. Measurement and control of level in a tank using capacitive transducer.
4. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
5. Measurement and control of temperature of a process using resistance temperature detector with SCADA.
6. Measurement and control of flow of a process using SCADA systems.
7. Study and use of a Seismic pickup for the measurement of vibration.
8. Calibration of capacitive transducer for angular displacement.
9. Study and calibration of Mcleod Gauge for low pressure measurement.

CNC & ROBOTICS LAB AND MOTION CONTROL DESIGN LAB

B.Tech. III Year MT - II Sem.   **L T P C**
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CNC & ROBOTICS LAB

Note: Any Six from the following
1. Study and operation of CNC lathe
2. Study and operation CNC milling machine
3. Preparation of testing of typical part programs on CNC Trainer.
4. Preparation of typical part programs on CNC milling machine.
5. Exercises using CAM software.
6. Part program generation through G and M Codes for turning, contouring, drilling, Reaming and Milling.
7. Development of tool path simulation by setting tool offsets for multi operations.
8. Machining of various Components by generation of CNC code by CAM Software
9. Robot Programming for a given path.

MOTION CONTROL DESIGN LAB

Note: Any Six from the following
1. Study of the following equipment:
       a. Flow Control Valves
b. Directional Control Valves
c. Pressure Control Valves
2. Circuits for reciprocating motion of a single acting and double acting pneumatic cylinders.
3. Circuits for reciprocating motion of hydraulic cylinders.
4. Circuits for speed control of a
(a) Single acting pneumatic cylinder.
(b) Double acting Pneumatic cylinder.
5. Circuits for semi automatic and automatic operation of a double acting Pneumatic cylinders.
6. Circuits for semi automatic and automatic operation of a double acting hydraulic cylinders.
7. Circuits for sequencing motion of two pneumatic cylinder using a sequence valve
8. Circuit for Measurement of pressure of oil in a hydraulic system.
9. Design and simulation of pneumatic circuits using simulation software
10. Design and simulation of hydraulic circuits using simulation software

MICROPROCESSORS AND MICROCONTROLLERS LAB

III Year B.Tech. MT II-Sem   **L T P C**
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Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)
- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit (6 weeks)
- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
  2. Time delay Generation Using Timers of 8051.
  3. Serial Communication from / to 8051 to / from I/O devices.
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ

Cycle 3: Interfacing I/O Devices to 8051(5 Weeks)
  1. 7 Segment Display to 8051.
  2. Matrix Keypad to 8051.
  3. Sequence Generator Using Serial Interface in 8051.
  4. 8 bit ADC Interface to 8051.
  5. Triangular Wave Generator through DAC interfaces to 8051.

TEXT BOOKS:
  1. Advanced Microprocessors and Peripherals by A K Ray, Tata McGraw-Hill Education, 2006
  2. The 8051 Microcontrollers: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

III Year B.Tech. MT II-Sem   **L T P C**
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1. INTRODUCTION:
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:
This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:
The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/   e-mails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:
The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:
The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:
1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCES:
1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.