

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech. in METALLURGICAL AND MATERIALS ENGINEERING

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

MECHANICAL WORKING OF METALS LAB

III B.Tech.(MME) I Semester

L T P C
0 0 3 1.5

Course objectives: This lab course is designed to know the various testing methods for evaluation of metal forming techniques

Course outcomes: Upon successful completion of this course, the student will be able to

1. Determine strain hardening exponent from the stress-strain diagram.
2. Understand the difference between simple, progressive and compound dies.
3. Understand the effect of cold working and annealing on microstructure.
2. Illustrate the effect of friction and semi die –angle on metal flow in extrusion.
3. Practice various deformation processes like extrusion, deep drawing and redrawing.

LIST OF EXPERIMENTS:

1. To determine the formability of given materials by Erichson cup test
2. To manufacture washer components using fly press (progressive dies /compound dies)
3. Deep drawing of a cup with / without blank holder by hydraulic press
4. Redrawing of a cup with / without blank holder by hydraulic press
5. To determine the friction factor by ring compression test
6. Determination of strain hardening exponent 'n' and strength coefficient 'k'
7. To verify Hall-Petch relation in MS specimen.
8. To determine the effects of cold working on the microstructure and mechanical properties of given metal.
9. To demonstrate the effect of friction and height-to-diameter ratio in the axi-symmetric compression of a cylinder.
10. To analyze the load and metal flow in extrusion with different friction conditions and semi-die angles.

List of Equipment:

1. UTM, 2. Hydraulic press, 3. Fly press, 4. Erichson cup Tester

EXTRACTIVE METALLURGY LAB

III B.Tech.(MME) I Semester

L T P C
0 0 3 1.5

Course objectives: The basic objective of the course is to provide hands on practice on various types of unit process industrially important nonferrous metals

List of experiments:

1. To find the efficiency of electrolytic cell for Cu refining
2. To find the effect of time on leaching of an oxide ore
3. To find the effect of temperature on leaching of an oxide ore
4. To conduct cementation of Copper ore
5. Electro wining of a nonferrous metal
6. To determine the effect of temperature on calcination of lime stone
7. To find the effect of time on calcination of lime stone
8. To find the weight loss on calcination of lime stone
9. To find the effect of time on roasting of a sulphide ore
10. To find the effect of temperature on roasting of a sulphide ore

List of equipment:

1. Muffle Furnace, 2. Oxygen Cylinder, 3. Digital electronic balance, 4. Ceramic crucible, 5. Electrochemical cell

Course outcome: Upon successful completion of this course, the student will:

1. Understand pyrometallurgical extraction concepts like roasting, calcination
2. Realize Hydrometallurgical extraction fundamentals
3. Understand the elctrometallurgical extraction concepts

ENVIRONMENTAL DEGRADATION OF MATERIALS LAB

III B.Tech.(MME) I Semester

L T P C
0 0 2 1

Course Objective: This lab course is designed to conduct the experiments on electrodeposition, verification of Faraday's laws and evaluation of factors affecting on corrosion

Course outcomes: Through this laboratory practice, the student will be able

1. To judge the process variables like current efficiency, current density.
2. To obtain desired electro deposition.
3. Hands on experience on equipment designed for evaluation of corrosion studies.

LIST OF EXPERIMENTS:

- 1) Study the effect of concentration and temperature on conductivity of an aqueous electrolyte (NaCl)
- 2) Verification of Faraday's laws
- 3) Electroplating of copper on brass and to study the influence of current density on current efficiency.
- 4) Electroplating of Nickel using watt's bath and to study the influence of current density on current efficiency
- 5) Electroplating of chromium on mild steel and to study the influence of current density on current efficiency.
- 6) To anodise the given aluminium sample and observation of microstructure
- 7) To understand the principles in galvanic cell corrosion using "Ferroxyl" indicating test solution.
- 8) To determine the throwing power of electroplating bath
- 9) To study the intergranular corrosion of Austenitic stainless steels
- 10) To conduct electropolishing of stainless steel using Nitric acid batch.

List of equipment:

1. Rectifier
2. Ammeters
3. Rheostats
4. D C Regulated Power Supply instrument
5. Electropolishing Equipment
6. Multimeters
7. Conductometers
8. Digital weighing balance

MATERIAL PROCESSING LAB

III B.Tech.(MME) II Semester

L T P C
0 0 3 1.5

Course objectives: This lab course is designed to provide hands on experience on various foundry testing methods for evaluation of moulding sand properties, also designed to make the student to understand and demonstrate the various types of welding processes and its variables.

Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Determine moulding sand dry, hot and green strength
2. Understand the preparation of moulding sand
3. Determine moulding sand properties by varying additives
4. Understand the Melting of Al alloys
5. Gain hands on experience in various methods of welding and joining of metals and understand the mechanical behavior of the joint with respect to microstructure and mechanical properties.

LIST OF EXPERIMENTS:

1. Preparation of gating system using green sand moulding.
2. Study of permeability of green sand with clay and water.
3. Determination of sand properties: green and dry strength, green and dry hardness, hot shear strength with variation in sand additives.
4. Determination of clay content in sand.
5. Determination of the shatter index of green sand
6. Melting of Al alloys in a pit furnace and casting into light components
7. Preparation of a shell by shell moulding process
8. Study and observe the identification of flames using gas welding techniques and prepare a Butt joint with gas welding.
9. Preparation of a butt joint with mild steel plates using Arc welding process and study the comparison of the bead geometry with DCSP, DCRP and A.C.
10. Demonstration and practice of resistance spot welding process and plot the variation of spot area with time and current variation
11. Preparation of a butt joint with mild steel strip using tungsten inert gas (TIG) welding process.
12. Preparation of a butt joint with mild steel plate using submerged arc welding (SAW) process.
13. Preparation of a butt joint with mild steel plate using MIG welding process.
14. Evaluation of microstructure of welded joint and observe the structural difference in weld zone, heat affected zone (HAZ) and base metal

LIST OF EQUIPMENT:

1. Mould Boxes, Patterns, Core Boxes, Tool Boxes. 2. Sieve Shaker 3. Permeability Apparatus. 4. Universal Sand testing Machine with Accessories. 5. Sand Hardness tester. 6. Clay Content Apparatus 7. Shatter Index test apparatus. 8. Pit Furnace/ Electric Furnace 9. Shell Moulding Machine 10. Centrifugal Casting Machine 11. Ultrasonic Tester. 12. Ladles, Crucibles and other Accessories. 13. Muffle Furnace 1000^oc 14. Centrifugal Casting Machine 15. Gas welding equipment. 16. Spot welding Machine 17. TIG Welding Machine 18. Arc welding Machine. 19. MIG welding Machine 20. Submerged Arc Welding machine

**MODELING AND SIMULATION LAB FOR
METALLURGICAL AND MATERIALS ENGINEERING**

III B.Tech.(MME) II Semester

**L T P C
0 0 3 1.5**

Course objectives: This course is designed to impart hands-on experience on the various modelling and simulation techniques used in metallurgical and materials engineering.

Course outcomes: Students will acquire a hands-on training on

1. Different computational, modelling and simulation techniques.
2. Students will know the importance of Metallurgical Computations, modelling and simulation techniques for supplementing experiments for understanding of materials behaviour.

List of experiments:

1. Computing heat and mass calculations of chemical reactions
2. Determination of Crystal structures using computer principles
3. Programming of pressurized and non-pressurized Gating system
4. Programming on calculation of electrode potential at nonstandard conditions
5. Programming of Riser system
6. Programming to determine the charge input to get the required output of pig iron in a blast furnace.
7. Computation of binary phase diagrams
8. Computation of Pour-baix diagrams

TEXT BOOKS:

1. Computer oriented Numerical methods – V. Rajaraman (PHI Publicatons)
2. Computer programming and Numerical methods – S. Saran
3. Numerical methods in engineering – Mario G. Salvadori and Melvin L. Baron
4. Matrix operation on Computer – L.L. Brirud (LCUE Publication)

ADVANCED COMMUNICATION SKILLS LAB

III B.Tech.(MME) II Semester

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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, Aysa Vishwamohan, Tata Mc Graw-Hill 2009.