

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech. in PETROLEUM ENGINEERING

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

INSTRUMENTATION AND PROCESS CONTROL LAB

B.Tech. III Year I Sem.

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Prerequisites: Basic knowledge of Instrumentation and Process Control

Course Objectives: Instrumentation and Process Control laboratory enables a “hands-on” environment that is important for developing students’ understanding of theoretical ideas. Instrumentation and Process Control laboratory is equipped with different instruments like computer-based temperature measurement, level detection, pressure measurement, flow measurement etc. and different types of valves, and operations in process control loop. On different panels or rigs these are arranged in different control configurations to achieve specific control objectives.

Course Outcomes: By the end of the course, students should be able to:

- develop awareness of safety in the laboratory so that all laboratory work is carried out in a safe manner
- develop the ability to carry out experimental investigations of processes which include creating equipment diagrams and comprehensive safe operating procedures for various unit operations
- determine a specific set of experimental objectives
- develop the ability to work in a team and develop confidence through the application of previously acquired knowledge of unit operations, chemical reactions, process safety, and process control
- learn how to apply software tools typically used by process control professionals

List of Experiments:

1. Calibration and determination of time lag of various first and second order instruments Major equipment - First order instrument like Mercury-in-Glass thermometer and Overall second order instrument like Mercury-in-Glass thermometer in a thermal well
2. Experiments with single and two capacity systems with and without interaction Major equipment- Single tank system, Two-tank systems (Interacting and Non-Interacting)
3. Level control trainer
Major equipment - Level control trainer set up with computer
4. Temperature control trainer
Major equipment - Temperature control trainer with computer
5. Cascade control
Major equipment - Cascade control apparatus with computer
6. Experiments on proportional, reset, rate mode of control etc.
Major equipment – PID control apparatus
7. Control valve characteristics
Major equipment – Control valve set up
8. Estimation of damping coefficient for U-tube manometer
Major equipment - U-tube manometer
9. Calibration of Mercury in glass thermometer
- 10 Calibration of Thermocouple
- 11 Calibration of Pressure Gauge
- 12 Calibration of Rotameter

DRILLING FLUIDS LAB

B.Tech. III Year I Sem.

L T/P/D C
0 0/2/0 1

Prerequisites: Drilling Technology

Course Objectives:

- To inform the students about the primary functions of drilling fluid
- To introduce the test procedures for controlling the properties of drilling fluid
- To introduce the common additives used to obtain the desirable properties under various drilling conditions
- To explain main factors governing the selection of drilling fluids
- To improve technical report writing skills

Course Outcome:

- The students will be able to design desired drilling fluid.
- They will be aware of weighing additives and viscofiers.
- They can control filter loss.
- They can maintain hydrostatic pressure to prevent the well and rig from getting damage.

List of Experiments:

1. Determination drilling fluid weight.
Equipment: Mud Balance
2. Determination of mud viscosity.
Equipment: Marsh Funnel
3. Determination of pH of mud.
Equipment: pH meter and Hydrion pH dispensers
4. Determination of mud rheology (Viscosity, Gel strength, and Yield point).
Equipment: Rheometer / Fann Viscometer
5. Determination of the loss of liquid from a mud.
Equipment: Standard API Filter-press
6. Determination of a drilling mud cake and evaluate resistivity.
Equipment: Fann Digital Resistivitymeter
7. Determination of the effect of adding bentonite on mud properties.
8. Drilling fluid contamination test (Salt, Gypsum & Cement contamination).
9. Determination of solid and liquid content and emulsion characteristics of drilling fluid.
Equipment: Sand Content Set, Fann Emulsion and Electrical Stability Tester
10. Oil, water, solid and clay content determination.
Equipment: Oil-Water Retort Kit
11. Determination of water ratios for portland cement slurry.
(Effect of water ratio on free water separation normal and minimum water content and thickening time)
Equipment: The Atmospheric Consistometer
12. Determination of compressive strength of cement test moulds.
Equipment: Compressive Strength Testing Machine / UTM

ENERGY AND ENVIRONMENTAL ENGINEERING LAB

B.Tech. III Year I Sem.

L T/P/D C
0 0/2/0 1

Prerequisites: Environmental Engineering and Energy Engineering

Course Objectives:

- To estimate pH, TDS & Conductivity, Hardness, Turbidity, Fluoride of ground & surface water
- To analyse the air to understand the pollution level
- To understand different parameters of fuel cell and concept of energy audit

Course Outcome: The student will be able to understand various aspects of energy and environment which are very much essential in the industry

List of Experiments:

1. Estimation of chemical and physical parameters of Ground and Surface water: pH, TDS & Conductivity, Hardness, Turbidity, Fluoride, Color analysis. Pesticide Microbial analysis: e-coli/ total coli forms bacteria
2. Estimation of physical parameters of waste water: pH, TDS, Hardness, Turbidity, Alkalinity etc.
3. Estimation of chemical parameters of waste water: COD, BOD, TSS
4. Water and waste water treatment: Small RO system for treatment of ground water. Same above system with UF membrane for turbidity removal and water disinfection
5. Analysis of Air: Estimation of SPM, RSPM, Sox, Nox, CO and ozone in atmospheric air to study air pollution.
6. Fuel cell Test Kit [Energy]: A small ½ watt to 1-watt fuel cell with water electrolysis kit (H₂ and O₂ Generation) plus small volt meter and ammeter for measuring fuel cell performance (Three experiments can be conducted using this kit).
7. One small transparent anaerobic/aerobic biological reactor with slurry pump and aerator for treatment of industrial effluents to reduce COD levels.
8. Energy auditing of your Department.

List of Equipment:

pH meter, Colorimeter, TDS meter, Aerobic /Anaerobic reactor 25L capacity, BOD incubator, High accuracy analytical balance (5 digit), Desiccators, RO system with domestic 2''x12'' Membrane module, H₂S vial kit, Water analysis kit, UV-Vis spectrophotometer, High volume air sampler, Bomb calorimeter, Fuel cell test kit, Microscope.

PETROLEUM RESERVOIR ENGINEERING LAB

B.Tech. III Year II Sem.

L T/P/D C
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Prerequisites: Petroleum Geology, Reservoir Engineering

Course Objective: To make familiar students with reservoir fluid and rock properties such as Porosity, Permeability, Saturation, Wettability, Viscosity, Contact Angle, Surface Tension and Interfacial Tension

Course Outcome: The students should be in a position to

- predict the type of rock
- find out the amount of hydrocarbon in the reservoir
- determine the amount of recoverable hydrocarbon

List of Experiments

1. Determination of effective porosity by gas expansion method.
Equipment: Helium Porosimeter (Nitrogen gas can be used in place of helium).
2. Determination of porosity and pore size distribution by mercury injection.
Equipment: Mercury Porosimeter
3. Measurement of surface tension & interfacial tension with the ring tensiometer.
Equipment: Ring Tensiometer
4. Determination of fluid density using Pycnometer and Hydrometer methods.
Equipment: Pycnometer and Hydrometer
5. Liquid viscosity measurement using capillary tube viscometer (Ostwald type).
Equipment: Capillary Tube Viscometer.
6. Determination of capillary pressure of reservoir rock (core) using porous plate method.
Equipment: Capillary Pressure Cell
7. Measurement of contact angle (between oil, water and solid surface) using imaging method.
Equipment: Image System Set-up
8. Measurement of Air Permeability.
Equipment: Constant Head Permeameter with the Hassler cell / Gas Permeameter
9. Absolute permeability measurement of water.
Equipment: Darcy Apparatus / Liquid Permeameter
10. Determination of relative permeability of oil-water using unsteady state method.
Equipment: Relative Permeability Apparatus
11. Determination of relative permeability of gas-oil using unsteady state method.
Equipment: Relative Permeability Apparatus

PETROLEUM PRODUCT TESTING LAB

B.Tech. III Year II Sem.

L T/P/D C
0 0/2/0 1

Prerequisites: Petroleum Refinery Engineering

Course Objectives

- To aware of various petroleum products
- To know characteristics or properties of petroleum products
- To get acquainted with basic separation and conversion processes used in refining of crude oil

Course Outcome: Students will be able to understand which characteristics should be measured for the fuel while it is transporting, storing and usage.

List of Experiments:

1. Determination of Distillation characteristics of crude oil & its products.
2. Determination of Reid vapour pressure of crude oil & gasoline.
3. Determination of Viscosity of diesel and transformer oils.
4. Determination of Smoke point of kerosene.
5. Determination of Carbon residue of petroleum oils.
6. Determination of Flash & Fire points of gasoline, kerosene and other products.
7. Estimation of Water content in petroleum products.
8. Estimation of calorific value of LPG/gasoline.
9. Determination of Aniline point of gasoline and diesel oil.
10. Determination of Softening point of bitumen.
11. Determination of Cloud & Pour points of petroleum products.
12. Detection of Corrosiveness of petroleum products.

ADVANCED COMMUNICATION SKILLS LAB

B.Tech. III Year II Sem.

L T/P/D 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.