INDIAN INSTITUTE OF PETROLEUM AND ENERGY
Visakhapatnam – 530003

Ref. No. IIPE/Estb/LDCE/Sr. Lab Asst./2025/01 Date: 19.04.2025

NOTIFICATION

Subject: Mode of Selection and Syllabus for filling up the posts of Senior Lab Assistant on promotion basis through Limited Departmental Competitive Examination (LDCE)-Reg.

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1. Please refer IIPE advertisement No. IIPE/Estb/LDCE/2025/01 dated 21.03.2025 placed on the Institute's website inviting applications to fill the posts of **Senior Lab Assistant (PL-5)** through promotion, based on the Limited Departmental Competitive Examination (LDCE).

2. As per the notified advertisement and Recruitment & Promotion Policy for Non-Teaching Staff of the Institute as amended from time to time, the eligible and shortlisted candidates for promotion to the posts of **Senior Lab Assistant** through **LDCE mode** will be called to appear for the **Trade Test/ Written Test/ Computer Proficiency Test** as enumerated in the succeeding paragraphs.

3. The Trade Test will be held from **10:30 AM** on **27th April, 2025** (Sunday) and Written Test & Computer Proficiency Test will be held from **9:30 AM** on **28th April, 2025** (Monday) at IIPE Campus, AUCE Building, Visakhapatnam.

4. **Mode of selection:** Screened-in/ Shortlisted candidates are required to appear for the below Tests:

Sl. No.	Examination Type	Maximum Marks	Allotted Time
Stage-I			
(i)	Trade Test	100 Marks	Will be intimated at the time of test.
Stage - II			
(i)	Written Test	80 Marks	120 Minutes
(ii)	Computer Proficiency Test	20 Marks	30 Minutes
Sub Total		**100 Marks**	

The shortlisted candidates will be called to appear in the Trade Test (qualifying in nature). The candidates qualified in the Trade Test will be called for Written Test and Computer Proficiency Test. A Merit List of candidates who qualify in the Written Test and Computer Proficiency Test, will be prepared on the basis of the marks obtained in the Written Test and Computer Proficiency Test. The Committee constituted to conduct the Written Test, Computer Proficiency Test and Trade Test will decide the minimum qualifying marks for each test in accordance with the number of vacancies and performance of the candidates and its decision shall be final.

5. The indicative syllabus for the Trade Test, Written Test and Computer Proficiency Test is placed at **Annexure-I**.

19.04.2025
Registrar

R. P. DWIVEDI
Registrar
Indian Institute of Petroleum & Energy
Visakhapatnam

Encl: As above.

Copy to: IIPE Website.

Info: Director, IIPE.

Annexure-I

SYLLABUS FOR
THE POST OF SENIOR LAB ASSISTANT

The indicative syllabus for Trade Test, Written Test and Computer Proficiency Test for filling up the post of **Senior Lab Assistant** on **promotion through LDCE Mode**, is as follows:

Stage-I: Trade Test		This consists of MCQs carrying **40 marks** and Practical Test/ Experiment (s) for **60 marks,** based on the candidate's relevant field. The candidates are required to perform a given practical test/ experiment (s) related to their area of specialisation and demonstrate their practical skills accordingly. The syllabus for different categories of candidates, such as those from Petroleum Engineering, Chemical Engineering and Computer Science Engineering, has been **provided below**.	**Maximum Marks: 100** (Qualifying in nature)
Stage-II: **(i) Written Test**	**Part-A**	**General Awareness about the Institute & its establishment**: • IIPE Act; • IIPE Statutes; • IIPE Ordinances; • General Council (GC); • Board of Governors (BoG); • Finance Committee (FC); • Senate; • Building & Works Committee (BWC); • About Permanent campus; • Patents, Research & Development and Consultancy Rules of IIPE; • Academics & Admissions at IIPE; • Annual Report & Annual Statement of Accounts of the Institute; • Library Resources; • Software Resources; • Various Events of the Institute; • Trustees & Industry Partners of Institute. • Service rules related to Establishment, Administration, Procurement & Finance commonly applicable to all employees of IIPE; • Pay & Allowances commonly applicable to all employees of IIPE; • Various forms used by employees in the Institute; • Recruitment Rules for faculty and staff; • Right to Information Act (RTI); • Medical OPD/IPD rules of the Institute.	**Maximum Marks: 40** This may include MCQs, Fill in the blanks and descriptive questions.
	Part-B	This section will include questions **exclusively** from the candidate's respective field or area of specialisation. Accordingly, the syllabus for different categories of candidates, such as those from Petroleum Engineering, Chemical Engineering and Computer Science Engineering, has been **provided below**.	**Maximum Marks: 40** This may include MCQs, Fill in the blanks and descriptive questions.
Stage-II: (ii) Computer Proficiency Test		The Computer Proficiency Test may include MS Word, MS Excel and Power Point etc.	**Maximum Marks: 20**

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Specialisation: Petroleum Engineering	
Stage-I: Trade Test Syllabus	**Drilling & Fracturing Lab** • Formulation of mud and fracturing fluid; characterization of mud and fracturing fluid through viscometry and rheometry. • Fluid loss tests for mud and cement. • Routine measurements of density, viscosity, sand content. • Thickening time measurements, atmospheric consistometer for cement. • Increase of density of mud through particle addition (mud balance); particle settling in transparent mud. • Proppant transport • Stress-strain measurements **Reservoir Engineering Lab** • Core permeability studies using gas permeameter and liquid permeameter. • Determination of the effective porosity of core sample by saturation method. • Analysis of BHP Chart. • Determination of the surface tension and contact angle of liquid hydrocarbon systems. • Characterization of crude oil through viscometry. • Coring from the rock; study of thin section under microscope with digital camera and automatic point counter. ***Production Engineering Lab*** **Flow experiments:** • Phase separation in transparent acrylic set-up (Both horizontal and cyclone type) • Pressure drop in two / three phase flow in transparent pipe • Measurement of gas flow rate in pipeline using orifice meter and turbine meter • Formation damage and matrix acidizing • Rock-fluid interaction in rotating disc apparatus **Fluid properties:** • Hydrocarbon dew point determination • Sulphur (H2S) quantification in gas • Calorific analysis of natural gas • Analysis of produced brine (pH, TDS, concentration of scale forming ions) • Determination of water and sediment in crude oil by centrifuge • True Boiling Point curve for crude oil • Karl-Fischer measurement to determine water content of crude oil sample • Measurement of total acid number **Fuel Laboratory:** • ASTM distillation, Reid vapour pressure (RVP), Gum content (existent), Smoke point, Aniline point, Flash point, Moisture content by Dean & Stark method, Kinematic viscosity by Dynamic viscosity; Redwood viscometer, Pour point, Conradson / Ramsbottom Carbon residue, Rotational viscometer. Gaseous fuels: Orsat analysis, Calorific Value by Junkers calorimeter. Gas chromatography
Stage-II : Written Test (Part-B) Syllabus:	**Petroleum Exploration:** Classification and description of some common rocks with special reference to clastic and non-clastic reservoir rocks. Origin, migration and accumulation of Petroleum. Petroleum exploration methods. **Oil and Gas Well Drilling Technology:** Well planning. Drilling method. Drilling rigs Rig operating systems. Drilling fluids function and properties. Drilling fluid maintenance equipment. Oil & gas well cementing operations. Drill bit types and their applications. Drill string & Casing string function, operations, selection & design. Drilling problems, their control & remedies. Directional drilling tools. Directional survey. Application of horizontal, multilateral, extended reach, slim wells.

Reservoir Engineering: Petrophysical properties of reservoir rocks. Coring and core analysis. Reservoir fluid properties. Phase behaviour of hydrocarbon system. Flow of fluids through porous media. Water and gas coning. Reservoir pressure measurements. Reservoir drives, drive mechanics and recovery factors. Reserve estimation & techniques.

Petroleum Production Operations: Well equipment. Well completion techniques. Well production problems and mitigation. Well servicing & Workover operations. Workover & completion fluids. Formation damage. Well stimulation techniques. Artificial lift techniques. Field processing of oil & gas. Storage and transportation of petroleum and petroleum products. Metering and measurements oil & gas. Production system analysis & optimization. Production testing. Multiphase flow in tubing and flow-lines. Nodal system analysis. Pressure vessels, storage tanks, shell and tube heat exchangers, pumps and compressors, LNG value chain.

Offshore Drilling and Production Practices: Offshore oil and gas operations & ocean environment. Offshore fixed platforms, Offshore mobile units, Station keeping methods like mooring & dynamic positioning system. Offshore drilling from fixed platform, jack-up, ships and semi submersibles. Use of conductors and risers. Offshore well completion. Deep water applications of subsea technology.

Offshore production: Oil processing platforms, water injection platforms, storage, SPM and SBM transportation and utilities. Deep water drilling rig. Deep water production system. Emerging deep water technologies.

Petroleum Formation Evaluation: Evaluation of petrophysical of sub-surface formations: Principles applications, advantages and disadvantages of SP, resistivity, radioactive, acoustic logs and types of tools used. Evaluation of CBL/VDL, USIT, SFT, RFT. Production logging tools, principles, limitations and applications. Special type of logging tools. Casing inspection tools (principles, applications and limitations), Formations micro scanner (FMS), NMR logging principles. Standard log interpretation methods. Cross-plotting methods.

Oil and Gas Well Testing: Diffusivity equation, derivation & solutions. Radius of investigation. Principle of superposition. Horner's approximation. Drill Stem Testing. Pressure Transient Tests: Drawdown and build up-test analysis. Wellbore effects. Multilayer reservoirs. Injection well testing. Multiple well testing. Interference testing, Pulse testing, well-test analysis by use of type curves. Gas well testing.

Health Safety and Environment in Petroleum Industry: Health hazards in Petroleum Industry: Toxicity, Physiological, Asphyxiation, respiratory and skin effect of petroleum hydrocarbons, sour gases. Safety System: Manual & automatic shutdown system, blow down systems. Gas detection system. Fire detection and suppression systems. Personal protection system & measures. HSE Policies. Disaster & crisis management in Petroleum Industry.

Environment: Environment concepts, impact on eco-system, air, water and soil. The impact of drilling & production operations on environment, Environmental transport of petroleum wastes. Offshore environmental studies. Offshore oil spill and oil spill control. Waste treatment methods.

Enhanced Oil Recovery Techniques: Basic principles and mechanism of EOR, Screening of EOR process. Concept of pattern flooding, recovery efficiency, permeability heterogeneity. Macroscopic and microscopic displacement efficiency. EOR methods: Chemical flooding, Miscible flooding, Thermal recoveries (steam stimulation, hot water & steam flooding, in-situ combustion), Microbial EOR.

Latest Trends in Petroleum Engineering: Coal bed methane, shale gas, oil shale, gas hydrate, and heavy oil.

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Specialisation: Chemical Engineering	
Stage-I: Trade Test Syllabus	**Fluid Flow:** • Coefficient of discharge of Venturimeter; • Coefficient of discharge of Orficemeter; • Coefficient of discharge of Rotameter; • Bernoulli's Experiment; • Characteristics of centrifugal pump; **Heat Transfer:** • Parallel Flow Heat Exchanger; • Counter Flow Heat Exchanger; • Pool Boiling; • Thermal Conductivity of Metal Rod; • overall heat transfer co-efficient in a vertical condenser; **Fuel Lab:** • Redwood Viscometer; • Aniline Point; **Particle Technology :** • Efficiency of Ball Mill; • Screen Effectiveness; **Mass Transfer:** • Vapour Liquid Equilibrium; • Vapour in Air Diffusion; • Membrane Filtration; • Distillation; **Instrumentation and Process Control:** • Response of Mercury in Glass thermometer; • Response of Manometer; • Dynamics of single tank liquid level system; • Dynamics of Two tank Non-Interacting System; • Dynamics of Two tank interacting System; **Chemical Reaction Engineering:** • Isothermal Batch Reactor; • Plug Flow Reactor; • Continuous Stirred Tank Reactor; • Combined CSTR & PFR; • RTD.
Stage-II : Written Test (Part-B) Syllabus:	**Fluid Mechanics:** Fluid statics, Newtonian and non-Newtonian fluids, Bernoulli equation, Macroscopic friction factors, energy balance, dimensional analysis, shell balances, flow through pipeline systems, flow meters, pumps and compressors, packed and fluidized beds, elementary boundary layer theory **Particle Technology;** size reduction and size separation; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, mixing and agitation; conveying of solids. **Heat Transfer:** Conduction, convection and radiation, heat transfer coefficients, steady and unsteady heat conduction, boiling, condensation and evaporation; types of heat exchangers and evaporators and their design. **Mass Transfer:** Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage-wise and continuous contacting and stage efficiencies; HTU & NTU concepts design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption.

	Chemical Reaction Engineering: Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis. **Instrumentation and Process Control:** Measurement of process variables; sensors, transducers and their dynamics, transfer functions and dynamic responses of simple systems, process reaction curve, controller modes (P, PI, and PID);control valves; analysis of closed loop systems including stability, frequency response and controller tuning, cascade, feed forward control.

Specialization: Computer Science Engineering	
Stage-I: Trade Test Syllabus	**Fundamental concepts of C programming:** • Input/Output, • control statements, • arrays, • functions, • String - functions • pointers, • structures, • Dynamic Memory Management • Files **Managing the Data structures of**: • Linked lists • Stacks • Queues • Trees • Graphs **Implementing and analyzing the Algorithms of**: • Linear Search – iterative, recursive • Binary Search – iterative, recursive • Sorting Algorithms: (i) Bubble Sort (ii) Insert Sort (iii) Selection Sort (iv) Merge Sort (v) Quick Sort **Object-Oriented Programming Concepts**: • Objects, Classes, Messages, • Abstraction • Encapsulation • Inheritance • Polymorphism • Overloading vs Overriding methods • Exception Handling **Object-Oriented Programming using Python:** • In-built class usage: List, Set, Tuple, Dictionary, and String • Implementing OOP concepts in Python: creating classes, objects, and demonstrating inheritance and polymorphism. Creating and importing modules, handling exceptions • File I/O in Python

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	PHP in web development: • Writing simple scripts • Interacting with the database • server-side code to handle HTTP requests. • Building HTTP-based client-server programs. **Databases**: • *Basics* • RDBMS concepts • Writing SQL statements – to support CRUID operations • Database design – normal forms, ER diagrams • Transaction Management • Backup, Recovery • Hands-on 'mysql' usage **Operating System**: • Process Management • Process Synchronization • Memory Management • File System, Storage Management • Install and configure the Windows operating system. • Install and configure of Linux (Ubuntu/Red Hat) operating system. **Computer Networks**: • OSI Reference Model (7 layers) • TCP/IP model (5 layers) • IP addressing: IPv4, IPv6 • Subnetting, Supernetting, CIDR • Routing algorithms: Distance Vector, Link State • TCP vs UDP • Application protocols: HTTP, FTP, SMTP, POP3, IMAP, DNS, DHCP • Web architecture: client-server, peer-to-peer • Socket programming basics • DNS resolution process
Stage-II : Written Test (Part-B) Syllabus:	**C-Programming:** Introduction to digital computers; Introduction to programming, variables, assignments; expressions; input/output; Conditionals and branching; Iteration; Functions; Recursion; Arrays. Introduction to pointers; Character strings; Structures; Dynamic memory allocation. File Operations. **Data Structures and Algorithms:** Basic data structures: Arrays, Linked lists, Doubly linked lists, Circular linked lists, Operations on Queue, Operations on Stack. Search techniques: Linear search, Binary search. Sorting techniques: Bubble sort, Insertion sort, Merge sort, Quick sort. **Object Oriented Programming using Python:** Fundamental concepts of object-oriented programming: Introduction to the principles of object- oriented programming (classes, objects, messages, encapsulation, inheritance, polymorphism, exception handling, and object-oriented containers). Familiarize with Python basics, built-in data structures, functions, etc. Implement object-oriented concepts using Python. **Operating Systems:** *Linux Commands: Creation of user accounts, Directory* Management Commands, File Management Commands, General Purpose Commands, Filters, Communication Commands - Check the Process Status; Process Management Commands, Search Patterns.

	Text Editors in Linux: File operations (New, Open, Close, Save, Save and Exit, Print) – Text Editing operations (Inserting, deleting, finding, replacing, copying and moving). Shell Scripts: Use of shell scripts, Numerical operations, Looping, Swapping Technique, String operations, Using Command line arguments, Date Functions, Relational operations, Logical operations, Boolean operations, Basic arithmetic operations, Case statement, Search Directory or File. Installation of Windows/Linux Operating Systems and trouble shooting. **Computer Networks and Network Services:** Network Topologies: Type of Networks and Internet, IP Addressing, Creation of Subnets, Media Types, Network, Equipment Types and functions: Hubs, Switches, Routers, Modems, Transceivers, Firewalls, Wireless Controllers, Access Points. TCP/IP, Ethernet, Wi-Fi, Bluetooth, Mobile Networking, Protocols: ARP, EIGRP, TCP, UDP, HTTP, FTP, SSH, DNS, DHCP. **Web Technologies:** Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, HTML tags, Form controls, Cascading Style sheets, inline, embedded and external style sheets, Building CSS menu, Creating user style sheets, client-side scripting, Programming in Java Script. Server-side scripting using PHP: PHP Structure and Syntax - Integrating HTML with PHP - Syntax and Variables - Constants and Variables - Passing Variables between Pages – if Statements - if and else – switch case – for loop – for each loop. Includes: Includes and Functions for Efficient Code - Strings – Arrays and Array Functions - Sessions and Cookies – Sample Programs - Alternates to Incrementing/Decrementing Values.

Note: The syllabus given above for Stage-I & II is indicative only which may cover other topics/ areas which are not mentioned herewith, but are followed in the regular educational institutions of national importance like IITs/IIITs/NITs etc.

18th April 2025

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