



# INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, UNA [HP]

An Institute of National Importance under MHRD  
NIT Campus, Hamirpur [HP]-177005

Website: [www.iiitu.ac.in](http://www.iiitu.ac.in)



## GUEST FACULTY (ON CONTRACT BASIS) RECRUITMENT – DECEMBER 2018

### SYLLABUS FOR WALK IN WRITTEN TEST AND INTERVIEW ON 15, Dec.'18

#### 1. DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

##### 1. Data Structures and Algorithms

Development of Algorithms - Notations, Concepts - Arrays - Linked lists - Stacks and queues Trees  
-Tree Traversing - Operations on Binary Trees – Sorting and Searching techniques - Graphs - BFS, DFS -Shortest path problems.

##### 2. Operating Systems

Basic OS Concepts - Thread and process scheduling - Synchronization - Semaphores - Critical regions  
- Deadlock prevention and recovery - Memory Management - File Management - I/O Management –  
Case Studies on Windows and Linux OS.

##### 3. Computer Organization and Architecture

Basic structure of Computers - Arithmetic - Addition & subtraction of signed numbers - Multiplication -  
Integer division - Floating point operations - Pipelining - Multiple bus organization  
-Micro programmed control – Hazards - Memory System - Semiconductor RAM memory - Cache  
memory - Virtual memory - Secondary storage - I/O Organization - Interrupts - DMA - Buses -  
Interface circuits - Serial communication links.

##### 4. C Programming

C programming – Memory Concepts – Arithmetic Operations - Control Statements – Functions -  
Pointers – Structures – User Defined Data types - File handling.

##### 5. Microprocessors

8085 processor - Architecture - Bus organization - Registers - ALU - Instruction set of 8085 -  
Instruction format - Addressing modes - System design using controllers - Microprocessor Interfacing  
Techniques - Segmented memory concepts - Bus concepts.

##### 6. Computer Networks

Goals of networking, well-known applications such as email, ftp, and need for layered architecture  
OSI and Internet. Hosttohost communication: RS 232 over serial line; handshaking and error handling;  
packet switching; reliable transmission stop and wait, sliding window; logical connections. Multiple  
collocated hosts: addressing, LAN access methods; CSMA/CD, Ethernet, Token passing.

## **2. DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **1. Fundamentals**

Devices and Electronic Circuits, Network Analysis and Synthesis.

### **2. Signals, System, and Microwave**

Signals & Systems, DSP, ADSP, Electromagnetic Theory, Transmission lines, Antennas and Wave Propagations, Metamaterial Antennas, MIC, MICROSTRIP and STRIPLINE fundamentals, Microwave electronics, Microwave Components and Circuits.

### **3. Communication**

Statistical theory of Communication, Analog and Digital Communication, Wireless Communication, Broadband Access Technologies, Fiber optics and Optical communication, Satellite Communication.

### **4. Digital Systems**

Digital Systems, Analog Integrated Circuits, Microprocessors, Microcontrollers, Embedded systems, ARM system, DSP Processors.

### **5. VLSI**

Basics of VLSI, Digital VLSI, Analog IC Design, Verilog HDL, ASIC, DSP for VLSI, VLSI Testing, Low Power VLSI, EDA Tools.

### **6. Computer Architecture and Networks**

Computer Architecture and Organization, Computer Networks and Protocols, Ad Hoc Networks.

### 3. DEPARTMENT OF CHEMISTRY

#### Organic Chemistry

Reaction mechanism: Definition of reaction mechanism, transition state theory, kinetics, qualitative picture. Nucleophilic substitution: SN1, SN2, SNi. Aromatic nucleophilic substitution, SNAr, benzyne, SN1. Addition to carbon-carbon multiple bonds: Electrophilic, nucleophilic and free radical addition. Hydrogenation, halogenation, hydroxylation, hydroboration.

Elimination reactions: E1, E2, E1CB- mechanism, Oxidation and reduction: Theories of aromaticity Aromatic electrophilic substitution:

Fundamentals of photochemistry, Pericyclic reactions, electrocyclic, sigmatropic, cycloaddition and ene reactions, Woodward-Hoffmann rules, and FMO theory, Optical activity and chirality: absolute and relative configuration - R-S notation system, E, Z- nomenclature of olefins, Conformational analysis.

Rearrangement reactions: involving electron deficient, carbon, nitrogen, oxygen centers, Reagents in organic synthesis: and important name reactions

#### Inorganic Chemistry

Theories of coordination compounds - VB theory - CFT - splitting of d orbitals in ligand fields and different symmetries - CFSE - factors affecting the magnitude of  $10 Dq$

Structure: Structure of coordination compounds with reference to the existence of various coordination numbers (2, 3, 4, 5 & 6) – site, coordination number seven and eight. 18/16-electron rule, metallocenes

Reaction mechanism and catalysis: Wilkinson's catalyst - hydroformylation of olefins - Wacker-Smidt synthesis - Monsanto acetic acid process - Eastman Halcon process - Fischer-Tropsch process - hydrosilylation.

Types of solids - close packing of atoms and ions - bcc, fcc and hcp voids - Band theory of solids. Schottky and Frenkel defects Energy bands, insulators, semiconductors and conductors metals.

#### Physical Chemistry

Thermodynamics: Laws of thermodynamics, chemical potential, Gibbs Duhem equation and its applications Phase rule, colloids and micelles: one and two component systems, eutectic systems colloids: Distinction between suspension, colloidal solutions and true solutions, lyophilic and lyophobic colloids, Tyndall effect, stability of colloids, coagulation, emulsions, various types.

Electrochemistry: Nernst equation - Some electrochemical reactions of technological interest - corrosion and passivity of metals - construction and use of Pourbaix and Evans diagrams - methods of protection of metals from corrosion,

Chemical kinetics - theories of reaction rates - transition state theory and collision theory a comparison - enthalpy, entropy and free energy of activation, Enzyme catalysis - rates of enzyme catalysed reactions - determination of Michael's parameters.

Surface chemistry: types of adsorption isotherms, physisorption and chemisorption, Freundlich, derivation of Langmuir and BET isotherms, surface area determination and mechanism of heterogeneous catalysis, phase transfer catalysis.

#### **4. DEPARTMENT OF MATHEMATICS**

##### **List of topics (at the level of M. Sc.)**

Algebra, Matrix, Calculus, Differential Equations, Partial Differential Equations, Real Analysis, Complex Analysis, Integral Transforms, Numerical Methods, Fourier Series, Probability and Statistics.

#### **5. DEPARTMENT OF ENGLISH**

##### **Literature**

Chaucer to the 20th Century - Contemporary British Literature - American and other non-British Literatures - European Literature - Indian writing in English and Indian Literature in English translation - New Literatures in English - Commonwealth Literature- Literary Theory and Criticism.

##### **Linguistics and Applied Linguistics**

Language and linguistics – Relevance of linguistics to language teaching - Language acquisition and learning – Behaviourist and Cognitivist schools - L 2 Acquisition and learning – Theories of SLA and SLL - Theories of language teaching - English for specific purposes - Evaluation methods and testing techniques - Teacher orientation and training – Computer Assisted Language Learning.

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