



INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
UNA [H.P.]

An Institute of National Importance under MoE

Saloh, Una (HP)-177 209

Website : www.iiitu.ac.in

Email Address: registrar@iiitu.ac.in

Prof. A. N. GILL
REGISTRAR (i/c)

FR-II/Asst. Prof. G-II/Written Test-Syllabus/2021 - 1392

28, Sept.'21

Dear Candidates,

Sub.: Faculty Recruitment ... Written Test ... Syllabus ... informed ... reg.

Ref.: IIITU/FR-II/Asst. Prof. G-II/2021-869 dated 04, Aug.'21.

The application process is closed for the advt. cited in ref. Institute has received a lot of applications. The applications are being taken up for scrutiny as per the stringent norms of advt.

The provisionally shortlisted candidates for written test and interview will be displayed on our website once the scrutiny is over.

The written test will be conducted during the last week of Nov.'21 (tentatively).

The in-person written test will be held in the permanent campus of the institute at Saloh, Una, which is approximately 10 Km away from Una Interstate Bus Terminus/Railway Junction.

The exact schedule will be informed later.

Meanwhile the syllabus for written test is attached herewith to enable the candidates to prepare well and perform well in the written test.

No clarifications will be entertained from any source in this regard.

Amar Nath Gill

REGISTRAR

Encl.: i) Syllabus for written test in SoC.

ii) Syllabus for written test in SoE.



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Advt. No. IIITU/FR-II/Asst. Prof. G-II/2021-869 dated 04, Aug.'21

SCHOOL OF COMPUTING SYLLABUS FOR WRITTEN TEST

Unit 1: Engineering Mathematics:

Discrete Mathematics: Propositional and first-order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability: Random variables. Uniform, normal, exponential, Poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Unit 2: Programming Skills, Data Structures and Algorithms:

Programming in C. C++ and JAVA, Data types, Arrays, Functions, Pointers, Structures & Union, File handling; OOPS Concepts.

Recursion, Stacks, Queues, Linked lists, trees, Binary Search trees, Binary heaps, Graphs.

Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming, divide and conquer, Graph search, minimum spanning trees, and shortest paths.

Unit 3: Theory of Computation and Compiler Design:

Regular expressions and finite automata, Context-free grammars and push-down automata, Regular and context-free languages, pumping lemma, Turing machines and Undecidability.

Lexical analysis, Parsing, Syntax-directed translation, Runtime environments, Intermediate code generation, Code Optimization, Code Generation.

Unit 4: System Software and Networks

Operating System: Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Databases: ER model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing, Transactions, Concurrency control, Recovery, Query Processing & Optimization.

Computer Networks: Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

Unit 5: Computer Organization and Architecture

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating-point).

Machine instructions and addressing modes. ALU, datapath and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Written Test Details:

- a) Duration : 100 Minutes
- b) Total Marks : 100
- c) Type : A) Part-I : Multiple Choice : Max. Marks : $40 \times 1 = 40$
Questions
: B) Part-II : Fill in the blanks/
Numerical calculations : Max. Marks : $30 \times 2 = 60$
- d) Syllabus : Attached

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SCHOOL OF ELECTRONICS SYLLABUS FOR WRITTEN TEST

Unit 1: Networks, Signals and Systems:

Network solution methods: nodal and mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Time domain analysis of simple linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits; Linear 2 port networks; Driving point and Transfer functions.

Unit 2: Continuous-time signals:

Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals: discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeros.

Unit 3: Electronic Devices:

Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; P-N junction; P-N junction diodes; BJTs; MOS capacitors; MOSFETs.

Unit 4: Analog & Digital Circuits:

Small signal equivalent circuits of diodes, BJTs and MOSFETs; Simple diode circuits: clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers: Number systems; Combinational circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates, arithmetic circuits, multiplexers, decoders, encoders ; Sequential circuits: latches and flip-flops.

Unit 5: Control Systems:

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh Hurwitz criteria; Nyquist stability criteria; Bode plots.

Unit 6: Communications Random processes:

Autocorrelation and power spectral density, properties of white noise, Analog communications: amplitude and angle modulation and demodulation, spectra of AM and FM, Information theory: entropy, mutual information, Channel capacity theorem Digital communications: PCM, DPCM, digital modulation schemes, amplitude, phase and frequency shift keying (ASK, PSK, FSK), SNR and BER for digital modulation.

