NATIONAL UNIVERSITY

Third Year Fifth Semester Syllabus
Department of Computer Science and Engineering

Four Year B.Sc. Honours Course

National University

Subject: Computer Science and Engineering
Syllabus for Four Year B.Sc. Honours Course
Year wise courses and marks distribution

THIRD YEAR FIFTH SEMESTER

Course Code	Course Title	Credit Hours
530201	Peripheral and Interfacing	3.0
530202	Peripheral and Interfacing Lab	1.5
530203	Data and Telecommunications	3.0
530204	Data and Telecommunications Lab	1.5
530205	Operating System	3.0
530206	Operating System Lab	1.5
530207	Economics	3.0
	Total Credits in 5th Semester	**16.5**

Course Code : 530201	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Peripheral and Interfacing		

Interfacing techniques: Interfacing for Memory; Communication system; System overhead (DMA and Programmed data transfer); I/O ports and Control; Parallel and Serial Interfacing devices; Timing considerations; Noise considerations; Application of PPI, PIC, DMAC, PCI etc. **Digital Interfacing:** Programmable parallel ports and handshake input/output (IC 8255), Interfacing a Microprocessor to keyboards, X-lat, Display-Alphanumeric and multiplexed LED (Interfacing with IC 7447), Relay, Stepper motor, Incremental Encoder, Optical motor shaft encoder.

Modern data-entry devices: Scanners overview; Bar code reader; Optical mark reader (OMR);

Optical Character Reader (OCR); Tape Reader; Digitizer: Reading technique, Capacitive Electrostatic scanning digitizer.

Display devices: CRT; Basic CRT operations; Timing and frequencies; CRT controller ICs; LCD technologies; Passive and active matrix; LCD reliability; Electroluminescent display. **Printers:** Impact printers; Serial and line printing; Laser printing; Ink-Jet printing; Color printing; Plotters.

Storage devices: Floppy disk; Floppy disk controller (IC 8272) ; Magnetic hard disk and controller; Compact disk, magnetic tape storage.

Data Communication and Network: Introduction to asynchronous serial data communication, RS-232 C serial data standard, USART(IC 8251A) word format, Null Modem configuration, The GPIB, HPIB, IEEE 488 Bus.

Reference Books:

1. Microprocessor and Interfacing by Andrew Hall
2. Computer Peripherals (Part B) by Barry Wilkinson

Course Code : 530202	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Peripheral and Interfacing Lab		

Laboratory works based on **CSE 530201.**Understand SDK 86 board, write and execute a program in an SDK 86, Understand RS-232 standard, Connections and Cabling. Communicate between two Computers using parallel ports (Printer Port). Observe and manipulate Null modem Configuration. Communicate between two Computers using serial ports. Drive a single 7 segment LED display with 7447. Understand the basic characteristics of IC 8255.

Course Code : 530203	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Data and Telecommunications		

Data communication model: TCP/IP and OSI; data communication network components; different types of networks: circuit switching, packet switching networks, ATM, HDLC and X.25; signal and random processes; review of Fourier transformation and Hilbert transformation; Introduction to modulation techniques; continuous wave modulation: AM, PM, FM; sampling theorem; pulse modulation: PAM, PDM, PPM, PCM; companding; delta modulation; different PCM; multiple access techniques: TDM, FDM; quantization; digital modulation: ASK, FSK, PSK, BPSK, QPSK; constellation; bit error rate (BER), noise; echo cancellation; intersymbol interference; probability of error for pulse systems; concepts of channel coding and capacity; asynchronous and synchronous communications; hardware interfaces, multiplexers, concentrators and buffers; communication media; fiber optics; wireless transmission: propagation, path loss, fading, delay spread; spread spectrum: frequency hopping spread spectrum and direct sequence spread spectrum; CDMA; High speed digital access: DSL, SONET, SDH; error detection and correction techniques: parity check, CRC, block code and hamming code; flow and error control techniques: sliding window, stop and wait, ARQ and HDLC protocols; modes of communications: simplex, half-duplex and full duplex.

Reference Books:

1) Behrouz A. Forouzan, *Data Communications and Networking*, 4th Edition.

2) William Stallings, *Data and Computer Communications*, Published by Pearson, 8th Edition.

Course Code : 530204	Marks : 40	Credits : 1.5	Class Hours : --
Course Title : Data and Telecommunications lab			

Laboratory classes are based on the course **CSE 530203**. Upon successful completion of this laboratory, students should have knowledge about various communication protocols in physical layers, be able to identify different transmission media based on their characteristics and can apply different signal encoding schemes and analyze their performance. They can handle different error detection and error control mechanism as well as different flow control mechanism and quantitatively analyze their performance. Having experience on serial communication, they can also implement the NULL modem communication. They can also use different types of multiplexing in a real or simulated environment.

Course Code : 530205	Marks : 80	Credits : 3	Class Hours : 45
Course Title : Operating System			

Introduction: Operating system overview, computer system structure, structure and components of an operating system. **System calls:** class of system calls and description. **Process and threads:** process and thread model, process and thread creation and termination, user and kernel level thread, scheduling, scheduling algorithms, dispatcher, context switch, real time scheduling. **Concurrency and synchronization:** IPC and inter-thread communication, critical region, critical section problems and

solutions. **Resource management:** introduction to deadlock, ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, starvation. **File management:** File Naming and structure, file access and attributes, system calls, file organization: OS and user perspective view of file, memory mapped file, file directories organization, **File System Implementation:** implementing file, allocation strategy, method of allocation, directory implementation, UNIX i-node, block management, quota. **Memory management:** basic memory management, fixed and dynamic partition, virtual memory, segmentation, paging and swapping, MMU. **Virtual memory management:** paging, page table structure, page replacement, TLB, exception vector, demand paging and segmentation, thrashing and performance. **Disk I/O management:** structure, performance, low-level disk formatting, Disk arm scheduling algorithm, error handling, stable storage.

Reference Books:

1) Andrew S. Tanenbaum, *Modern Operating Systems*,

2) Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*.

Course Code : 530206	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Operating System Lab		

Lab based on the course CSE 530205. Source code of OS161 operating system and required tools developed by Harvard University, based on R3000 architecture will be used in the lab. Students will be asked to add operating system module such as memory management, system call, file system, drivers etc. In the lab for such modules problems will defined elaborately. The laboratory also train students in debugging using gdb based on R3000.

Course Code : 530207	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Economics		

Introduction: Definition, Microeconomics vs. macroeconomics, scope of economics, meaning of economic theory, some basic concepts- product, commodity, want, utility, consumption, factors of production.

Demand: Law of demand, factors determining demand, shifts in demand, demand functions, deriving demand curves, substitution and income effects, deriving aggregate demands, various concepts of demand elasticity and measurements, discussion on the method of estimating demand functions and demand functions and demand forecasting.

Supply: Law of supply and supply function, determination of supply, shifts in supply, elasticity of supply, market equilibrium.

Economic Theory of Consumer Behavior: reasons for consumption, Principle of diminishing marginal utility, indifference Curves, Budget Constraint, Utility Maximization and Consumer Equilibrium.

Consumer Demand: Change in Budget Constraints, Price Consumption Curve, Income Consumption Curve, Consumer Demand, market Demand, Engel Curve.

Production: Production functions, total, average and marginal products, law of diminishing marginal physical products, production isoquants, marginal rate of technical substitution (MRTS), optimal combination of inputs, expansion path, returns to scale, estimation of production function and estimation of cost function.

Cost: concepts of cost, short-run costs, relation between short-run costs and production, long run costs, economies and diseconomies of scale, relation between short run and long run costs, cost function and estimation of cost function.

Markets and Revenue: Meaning of market, different forms of market, concepts of total, average and marginal revenue, relation between average revenue and marginal revenue curves, relation between different revenues and elasticity's of demand, equilibrium of the firm.

Price and Output: Price and output determination under perfect competition, monopoly, monopolistic competition and oligopoly, profit maximization, price discrimination, plant shut down decision, barriers to entry.

Reference Books:

1. Samuelson and Nordhaus : *Economics*.

2. Bilsa: *Microeconomic Theory*.

3. Koutsoyiannis: *Modern Micro-economics*.

4. Dornburg and McDougall: *Macro-economics*.