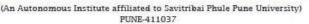


Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Technology





THE ROBOTICS FORUM

TRF RECRUITMENT 2022

SYLLABUS STUDY, REFERENCES FOR MCQ TEST & INTERVIEWS

ELECTRONICS DOMAIN

For Second Year and Third Year Students

I. Basic Electronics

- 1. Concepts of Current, voltage, resistance, capacitance, and inductance.
- 2. Kirchhoff's Law, Ohm's Law
- 3. RLC Circuits

II. Analog electronics

- 1. Operational Amplifiers: Inverting amplifier, non-Inverting amplifier
- 2. Transformers
- 3. Diode, BJT (Transistor as a switch and amplifier, operating modes of a transistor), MOSFET, IGBT

III. Digital electronics

- 1. Number System Overview
- 2. Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, EX-OR.
- 3. Combinational Circuits: Half Adder, Full Adder, Half Subtractor, Full Subtractor
- 4. Sequential Circuits: synchronous and asynchronous circuits, S-R latch,

Flip-Flops R-S Flip-Flop, J-K Flip-Flop, D Flip-Flop, T Flip-Flop

5. Boolean algebra: Bitwise addition, subtraction, 1's complement, 2's complement, Bitwise AND, OR and EX-OR.

IV. Actuators

- 1. Motors: DC, BLDC, Stepper and servo motor, Induction motors, Torque-speed characteristics of motors, Concept of back emf, Motor Driver control (PWM).
- 2. Pneumatics Actuators.
- 3. Relays: Electromagnetic relays, Solid state relays, Hybrid relays.
- 4. Switches: SPST, SPDT, DPST, DPDT, Push Buttons, Toggle Switch.

V. Power Electronics

- 1. Power supply: AC to DC conversion, Regulated power supply, SMPS.
- 2. Voltage regulator, 78XX family.

VI. Battery

- 1. LiPo battery, LiFe battery, lead acid battery, etc.
- 2. Battery selection calculations.

VII. Embedded Systems

1. Microcontroller (8051, Atmaga328P): Basics of memory organization and addressing modes of Atmega328p, Microcontroller architecture, Pin Configuration, DAC, ADC, Timers, and counters and their applications, Different buses, Interrupts, PWM resolution.

VIII. Communication

- 1. Analog Communication, Digital Communication, Wireless Communication Basics, Communication Protocols (UART, I2C, USART, SPI).
- 2. Bluetooth protocol, Web socket protocol.

IX. Sensors

- 1. Ultrasonic sensor, IR sensor, Different temperature sensors, Proximity sensors, Rotary encoder, hall-effect sensor, Tactile sensor, current sensor, Image sensor.
- 2. Sensitivity, accuracy, resolution of sensors.

X. Programming

1. C Programming, Arduino Programming, Basics of Assembly Language Programming

For Third Year Students

I. Analog Electronics

- 1. Operational amplifier: Inverting Summing amplifier, Differential amplifier,
- 2. Integrator, Differentiator, Voltage follower.
- 3. Buck converter.

II. Digital Electronics

- 1. K-maps, MUX and DEMUX, Encoder and Decoder.
- 2. Debugging tools of circuits: JTAG, SWD.

III. Communication Protocols

1. RS232, RS485, Power over Ethernet (PoE).

IV. Control Systems

- 1. Open-loop and closed-loop systems, PID Control, Network Theorems, Single & Two-Port Networks, resolution.
- 2. Parallel processing

V. Programming

- 1. Sorting Techniques
 - a. Bubble sort
 - b. Insertion sort
 - c. Selection sort
 - d. Quick sort
 - e. Merge sort
- 2. Searching techniques
 - a. Linear search
 - b. Binary search
- 3. Operations on stack and queue
- 4. Stack implementation using array
- 5. Queue implementation using array
- 6. Enqueue, Dequeue
- 7. Time complexity of algorithms
- 8. Basics of Object-oriented Programming (OOP's)
 - I. Classes and objects.
 - II. Constructor, destructor, and their types
- III. Pillars of object-oriented programming
 - a. Inheritance
 - b. Polymorphism
 - c. Encapsulation
 - d. Abstraction

REFERENCE FOR STUDY MATERIAL

I. Basic Electronic

- 1. Digital electronics- XI, XII, FUNDAMENTALS OF ELECTRONICS BY SUPEKAR.
- 2. Phadke prakashan electronics book for XI AND XII
- 3. https://www.tutorialspoint.com/basic_electronics/basic_electronics_types_of_transistors.htm

4.	https://www.tutorialspoint.com/semiconductor_devices/semiconductor_de	<u> </u>
	v ices operational amplifiers.htm	

5. https://www.tutorialspoint.com/pulse_circuits/pulse_circuits_transistor_as_switch.html