

**ANNEXURE I**  
**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

**UNIT-1: Electrical Engineering:** Ohm's law- Kirchhoff's law- star –delta transformation-basics of D.C Machines, motors and generators-A.C. machines-Thevenin's and Norton's theorems.

**UNIT-2: Industrial electronics and control engineering:-**Photo transistor, photo conductive device , photo multiplier , solar cell , opto-coupler, dot matrix and seven segment displays, bar graph, basic principles of induction heating, dielectric heating and resistance welding, generation and applications of ultrasonics.- basics of open loop and closed loop control systems-Transfer functions-signal flow graphs-Time response of first order and Second order system-concept of stability ( Routh Hurwitz and Root locus )

**UNIT-3: Electronics:** Resistor, capacitor and inductor specifications and applications of transformers, basics of switches , fuses , relays and microphones , Semi conductor materials, PN junction formation, forward and reverse biasing voltages, formation ,working and configurations of PNP and NPN transistors , Zener diode , FET , MOSFET , UJT , diode as rectifier ,C,LC and CLC filter circuits , RC coupled amplifier , transformer coupled amplifier , Darlington and cascaded amplifier , Class-A and Class-B push-pull amplifier , complementary type power amplifier, oscillator principle , RC phase shift and wien bridge oscillator , Boot strap sweep circuit , miller sweep circuit , bistable , astable and monostable multivibrator using transistor.

**UNIT-4: Digital Electronics:** Number systems , logic gates , half adder and subtractor , full adder , RS, T , D and Master-slave JK type flip-flops , counters, up/down counter , ring counter , Registers , shift registers , universal shift register , basic memories ( RAM and ROM ) , ADC ( Counter method, Successive approximation method ) and DAC.( R-2R method, Binary weighted method )

**UNIT-5 Electronic Measuring instruments:** Analog Instruments – Extension of range of Ammeter, Voltmeter and Ohmmeter – FET voltmeter – Differential voltmeter – Digital instruments – Ramp – Dual Slope integration – successive approximation – digital frequency meter. CRO – CRT – time base generator – deflection sensitivity – triggered sweep circuits – CRO applications -AF Oscillator – RF Signal generator – AF and RF Power meters – Q meter – Distortion Factor Meter – Digital IC tester – Logic and Spectrum Analyzer.

**UNIT-6: Process Instrumentation:** Fundamentals of instrumentation , basic transducer theory for the measurement of displacement( LVDT, Potentiometer, inductive, capacitive,), angular velocity, temperature ( Thermometers, RTD, Thermo couple,thermister,Pyrometers ), pressure ( elastic elements, Strain gauge,piezo electric ) , Flow ( Head type flow meters, rotameter, Electromagnetic flow meter, anemometers, Ultrasonic flow meter ) , PH , conductivity , weight , humidity , level , viscosity and density , detection of alpha, Beta and Gamma particles ,

**UNIT-7: Process Control:** On-off Control, Proportional, Integral and Derivative Controllers, PID Controller, Tuning of PID Controller, Actuators ( Pneumatic, electro-pneumatic Hydraulic ) basics of control valves, Cascade Controller, Ratio Controller, Adaptive Control, Line Diagrams, Letter Codes, Basic of CNC Machine, Basics of Robot.

**UNIT-8: Communications and Linear IC Applications:** Need and Types of Modulation, SSB, DSB and VSB transmission, AM and FM Transmitters, AM and FM Detectors, Basics of Pulse Modulation and Applications, Optical Fibre Communication, , Characteristics of Operational Amplifier, Applications of Operational Amplifier like (Summer, Integrator, Differentiator, Inverter, Voltage Follower, V to I Converter, I to V Converter, Comparator, Square wave Generator, Mono Stable Multivibrator, Astable multivibrator, Wienbridge Oscillator, Instrumentation Amplifier, Schmitt Trigger, ADC and DAC), Applications of 555 timer, Phase locked loop.

**UNIT-9: Analytical and biomedical instrumentation:** Electromagnetic Spectrum, Beer Lamberts Law, Mono Chromator, Light Sources and Detectors, Spectrophotometer ( UV, Visible, IR ), Flame Photometer, Spectrofluorometer, Polarimeter, Gas Analyzer, Mass Spectrometer, Liquid Chromatography and Gas Chromatography, Basics of Diagnostic Equipment ECG , EEG,EMG Blood flow measurement, Pace Maker, Defibrillator, X-Ray Equipment., CAT

**UNIT-10: Microcontroller & PLCs:** Architecture and Instruction set of 8051 Micro controller, interfacing peripherals (8255, 8251, 8257 and 8259) and applications of 8051.Basics of PLC-Architecture and instruction set of PLC and applications.

**ANNEXURE II**  
**Number of questions to be set**  
**APPLIED ELECTRONICS & INSTRUMENTATION ENGG**

UNIT NO	TOPICS	MARKS
I	Electrical engineering	06
II	Industrial electronics & Control Engg ( 5+4)	09
III	Electronics	12
IV	Digital Electronics	10
V	Electronic Measuring Instruments	08
VI	Process Instrumentation	14
VII	Process Control	14
VIII	Communication & Linear IC applications	08
IX	Analytical & Biomedical Instrumentation (6+5)	11
X	Micro controllers & PLC's (5+3)	08
		100

**ANNEXURE III**  
**MODEL QUESTIONS FOR ELECTRONICS AND INSTRUMENTATION**  
**ENGINEERING**

- Which of the following is the Bi-Directional flow meter?  
1) Orifice    2) Venturi meter    3) Electromagnetic Flow meter    4) Pitot tube
- Neutral Zone is equal to  
1)  $\Delta e$     2)  $\Delta e/2$     3)  $2\Delta e$     4)  $\Delta^2 e$
- Mass spectroscopy deals with  
1) Mass of ions    2) m/e ratio of ions    3) charge of ions    4) nuclear charge