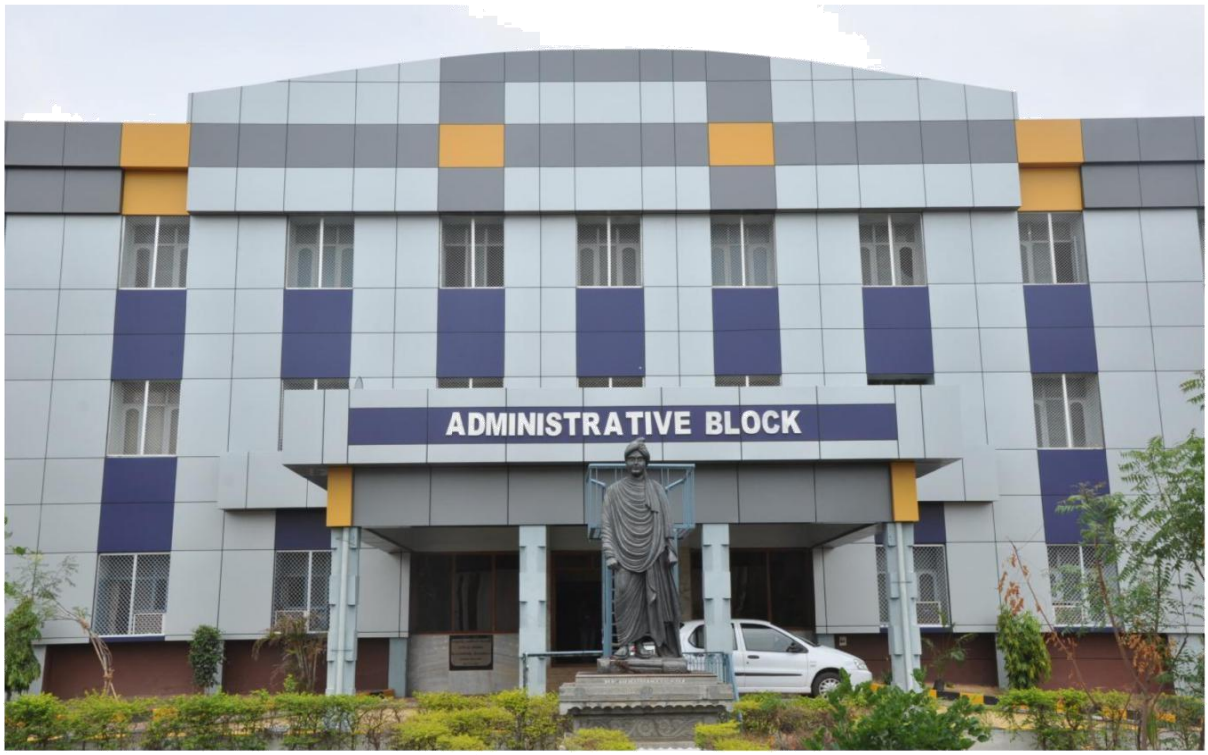
G. PULLA REDDY ENGINEERING COLLEGE (Autonomous): KURNOOL

Accredited by NBA of AICTE and NAAC of UGC with A+ Grade,

Affiliated to JNTUA, Anantapuramu



Scheme – 2020

Scheme and Syllabus for Minor Program in

Electrical & Electronics Engineering (EEE)

Offered by

Department of Electrical & Electronics Engineering

Department of EEE

Minor Degree in Electrical & Electronics Engineering (EEE)

Scheme of Instruction and Examination
(Effective from 2020-2021)

Scheme: 2020

S No	SEMESTER	COURSE CODE	COURSE NAME	L-T-P	CR
1	IV	MEE01	Measurement Techniques, Transducers and Sensors	3-1-0	4
2	V	MEE02	Motorised Hydraulics and Pneumatic Drive System	3-1-0	4
3	VI	MEE03	Programmable Logic Controller and Its Applications	3-1-0	4
4	VII	MEE04	SCADA Systems and Sequence of Event Recording System	3-1-0	4
1	MOOC-1				2
2	MOOC-2/Mini Project				2
Total Credits					20

MEASUREMENT TECHNIQUES, TRANSDUCERS AND SENSORS (MTTS)

B.Tech. EEE						Scheme : 2020		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	Total
MEE01	Minor	3	0	0	3	40	60	100

Course Outcomes : At the end of the course the student will be able to

CO1: The purpose of this course is to understand the various techniques and practices employed in the measurement of electrical parameters.

CO2: To Identify and select the suitable bridge for the measurement of Electrical parameters.

CO3: To identify and learn various of types of sensors, based on magnetic field, sound, light and learn the application associated with it.

CO4: To understand the working principle of various transducers used in the process industry.

UNIT – I	
Measurement of electrical parameters	Method of measuring voltage using PTs, Method of measuring current using CTs, Interposing CTs, Shunt and Hall effect sensor. Advantages/Disadvantages of CTs over shunts. True RMS voltmeter, simple methods of measurement of power in DC and AC systems. Method of electrical isolation. Voltage and current transducers.
UNIT - II	
Measurement of Resistance, Inductance and capacitance	Wheatstone bridge-sensitivity analysis, limitations, kelvin's double bridge, Maxwells bridge, schering Bridge, source and detectors, minimization of AC bridge errors, problems.
UNIT – III	
Inductive, capacitive, optical, Sensors and limit switches	Inductive proximity sensors and its working principle. Different types like flush, non flush, ring type. Various industry applications (like end travel sensing, metal sensing). Capacitive type proximity sensors and its working principle, various industry applications (like rice mill etc.,) Limit switches and its industry applications (like dead stop). Photo sensors (diffused beam, through beam, slotted sensor) working principle and industry application.
Laser, Ultrasonic, Radar type Sensors for distance and level measurement	Ultrasonic sensor for distance and level measurement (ON/OFF type, Analog type). Laser and Radar sensor for distance and level measurement with its industrial use application. Advantage and disadvantages. Conventional conductive sensor used in water tanks for level measurement. Light curtains for industrial safety. Touch and color sensors and its working principles and industrial applications.
UNIT - IV	
Temperature measurement and transducers	Methods of temperature measurement using RTD and its characteristics. Methods of temperature measurement using Thermocouple and thermistors and its charecteristics. Thermal expansions in solids, and bimetallic thermal strip activated relay for electrical protection. (like Over load relay, MCB). Temperature transducers and its characteristics.
UNIT - V	
Pressure, Flow	Methods of pressure measurement and its techniques. High and low pressure

measurement and transducers	measurement. Manometers, mcleoad gauge, Knudsen gause. Working principle of absolute and differential pressure transducers. Methods of Flow measurement and its techniques. Different types of flow meters like turbine type, positive displacement, electro magnetic, Drag force and ultrasonic flow meters. Flow transducers and its industrial use.

Text Books

1. E.W.Golding and F.C.Widdis, "Electrical Measurements and measuring Instruments", Wheeler Publishers
2. A.K.Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publishers
3. J. B. Gupta: "A Course in Electrical and Electronic Measurements and Instrumentation", S.K. Kataria & Sons

Reference Books

1. Buckingham and Price, "Electrical Measurements", Prentice – Hall
2. Reissland, M.U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers
3. H.S.Kalsi, "Electronic Instrumentation", Tata MCGraw-Hill Edition

Web References:

1. https://nptel.ac.in/content/storage2/courses/112103174/
2. https://nptel.ac.in/courses/108/108/108108147/

Question Paper Pattern:

Internal Assessment: The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section.

End Exam: The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub questions and the student should answer any one question from each unit. Each Question carries 12 marks.

MOTORISED, HYDRAULICS AND PNEUMATIC DRIVE SYSTEM (MHPDS)

B.Tech. EEE						Scheme : 2020		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	Total
MEE02	Minor	3	0	0	3	40	60	100

Course Outcomes : At the end of the course the student will be able to

CO1: The purpose of this course is to understand the various techniques and practices employed in the industry for moving drive system.

CO2: To Understand the different type of motorised movement that exists at present.

CO3: To understand the hydraulic and pneumatic systems that are in practice.

UNIT – I	
Motorised Drive systems	Need for motorized movements, to understand the need for variable speed in an industrial machines. DC motors and its speed control using DC drives. Armature voltage control and field weakening methods. Different applications of DC drives like Traction, Steel plants etc.. AC motors and speed control of AC motors using VFDs. Advantage and disadvantage of AC and DC drives. Principles and construction of Servo drives. DC servo Vs. Brush less AC servo. Positioning applications using servo drives. Working principles of stepper motors and its industrial applications. Units of different drives like AC/DC motors rated in hp/kW, servo in kg-mtr or Newton meter, Stepper motors on kg mtr and stepping angle.
UNIT - II	
Encoders and load cells and its application in the motorized drive system	Working principles of Rotary and linear encoders. Working principles of Absolute or incremental Encoder and its applications in servo, AC drive and stepper motor application. Strain gauge type load cells, and example of a batching plant involving motorized drive system and load cell transducers.
UNIT – III	
Hydraulic systems	Components of hydraulic systems like tanks, cylinders, manifold, valves, pilot valves, pipes etc., Methods of speed and power control in a hydraulic system using servo control valves. Industrial applications of hydraulic cylinders. Comparative study between motorized and hydraulic systems. Response time and characteristics of a hydraulic system.
UNIT - IV	
LVDT and Magnetic reed sensors	Working principles of LVDT and its applications in measurement of displacement and distance. Application of LVDT and reed switches in the control of a hydraulic system.
UNIT - V	
Pneumatic systems	Components of pneumatic systems like tanks, cylinders, manifold, valves, pilot valves, pipes etc., Methods of speed and power control in a pneumatic system using flow control valves. Industrial applications of pneumatic cylinders. Comparative study between pneumatic and hydraulic systems.

Text Books

1. A Fluid Power with applications Antony Esposito
2. B. Pneumatic Systems – Principles and Maintenance Mazumdar S. R
3. Sadhu Singh, Fluid Machinery, Khanna Publishing House
Reference Books
1. Oil Hydraulics Systems – Principles and Maintenance Mazumdar S. R
2. E. Fluid Power Chandashekhara P. K.
3. A.K. Babu, Automobile Mechanics, Khanna Publishing House
Web References:
1. https://nptel.ac.in/courses/112/105/112105046/
2. https://nptel.ac.in/courses/112/105/112105047/
Question Paper Pattern:
Internal Assessment: The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section. **End Exam:** The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub questions and the student should answer any one question from each unit. Each Question carries 12 marks.

PROGRAMMABLE LOGIC CONTROLLER AND ITS APPLICATIONS (PLC)

B.Tech. EEE					Scheme : 2020			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
MEE03	Minor	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100

Course Outcomes : At the end of the course the student will be able to

CO1: The purpose of this course is to understand the Fundamental concept of Automation.

CO2: To Understand the history of automation from 1st generation (relay based) to the latest and most modern technology used in automation

CO3: To understand the methods of integrating various components of automation like PLC, sensors, transducers, AC drives, hydraulics and pneumatics learnt in the previous semester.

UNIT – I	
Introduction to Automation	Introduction to 1st generation automation, advent of microcontroller and the introduction of logic controller. Difficulties of logic controller and the advent of programmable logic controllers. Classification of PLC based on the I/O, parts of plc, like CPU, Chassis, Power supply, I/O module etc.
UNIT - II	
Input and output system, CPU system	List of input and output device, methods of connecting input devices like source and sink. Methods of connecting output devices. CPU SCAN diagram, introduction to analog input and output, special inputs like high speed inputs etc. introduction of interface of encoders, lvdt, ultrasonic sensor, optical sensor, AC drives, stepper motors, switches and lamps (sensors covered in previous semester)
UNIT – III	
PLC Programming	Different methods of programming the PLC. Introduction to ladder programming, Data structures like I, Q, AI, AQ, M, R etc., instructions like NO,NC, Transition coils, set/reset coils, timers, counters, control functions, relational functions, arithmetic functions.
UNIT - IV	
Pneumatic sytems	Programming examples, for applications like cranes, ice vending machines, conveyors, Traffic lights, pick and place mechanism using sensors and VFDs.
UNIT - V	
HMI – Human machine interface systems	Introduction to HMI and need for using HMI. Different features of HMI and its methods of configuration. Use of HMI to above mentioned applications.

Text Books

1. F.G Shinskey., Process control systems: Application, Design and Tuning, 4/e, McGrawHill, 1996
2. P.R Be.langer, Control Engineering: A Modern Approach, Saunders College Publishing, 1995

Reference Books

1. R.C .Dorf and Bishop R. T. , Modern Control Systems, 11/e, Addison Wesley Longman., 2008
2. P.A Laplante., Real Time Systems: An Engineer.s Handbook, PHI, 2007
3. CH. Houpis and Gary B. Lamont, Digital Control systems, McGraw Hill, 1985

Web References:
1. https://www.electrical4u.com/programmable-logic-controllers/
2. https://www.watelectrical.com/industrial-applications-of-programmable-logic-controller/
3. https://nptel.ac.in/content/storage2/courses/112103174/
Question Paper Pattern:
Internal Assessment: The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section. **End Exam:** The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub questions and the student should answer any one question from each unit. Each Question carries 12 marks.

SCADA SYSTEMS AND SEQUENCE OF EVENT RECORDING SYSTEM (SCADA)

B.Tech. EEE						Scheme : 2020		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
MEE04	Minor	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100

Course Outcomes : At the end of the course the student will be able to

CO1: The purpose of this course is to understand the Fundamental concept of supervisory control against local control

CO2: The purpose is to create a mimic diagram of a process and to get a birds eye view of the entire process

CO3: The purpose is to understand how SCADA helps in improving the process.

UNIT – I	
Introduction to SCADA system	Introduction to SCADA software and its utilities in a process plants. Brief view of the SCADA software and its features.
UNIT - II	
Mimic diagram	Creating new project and its work bench properties. Configuring PLC ports, devices and tags. Configuring process screens for Bottling plant using object library. Creating the mimic screens and advantages of the same.
UNIT – III	
Live trends charts in a mimic diagram	Creating live trends and attaching points from the tag database. Concept of ODBC, OLE.
UNIT - IV	
Historian function and Data base logger, alarm management	Concept of RDBMS, creating a Data base logger application, configuring, creating historical trend and importing the same in CSV file, creating alarm screens.
UNIT - V	
Advanced functions in SCADA and Sequence of event recording	Understanding the advanced functions like web server, server redundancy, receipe management. The concept and sequence of event recording and its advantages, time stamping of the data events.

Text Books

1. Stuart A. Boyer: „SCADA-Supervisory Control and Data Acquisition", Instrument Society of America Publications, USA, 1999
2. Gordon Clarke, Deon Reynders, „Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK,2004
3. Efim Rosenwasser, Bernhard P. Lampe, „Multivariable computer-controlled systems: a transfer function approach", Springer, 20

Reference Books

1. Stuart A. Boyer,"SCADA-Supervisory Control and Data Acquisition", Instrument Society of

America Publications,USA,2004
2. Gordon Clarke, Deon Reynders, „Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK,2004
3. William T. Shaw, „Cybersecurity for SCADA systems", PennWell Books, 2006

Web References:

1. https://www.dpstele.com/scada/how-systems-work.php
2. https://www.processsolutions.com/understanding-scada-and-what-it-can-do-for-you/
3. https://nptel.ac.in/content/storage2/courses/108106022/LECTURE%201.pdf

Question Paper Pattern:

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