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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS INSTITUTION)

B. Tech III Year II Semester (R23) Regular End Semester Examinations, May 2026

ELECTRICAL MEASUREMENTS & INSTRUMENTATION

(Department of Electrical & Electronics Engineering)

Time: 3Hrs

Max Marks: 70M

Attempt all the questions. All parts of the question must be answered in one place only.

All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.	Question	Marks	CO	BL
1.	i) List the functional elements of the measurement systems.	1M	1	1
	ii) State the type of current (AC or DC) for which PMMC instruments are designed.	1M	1	1
	iii) What is Phantom Loading?	1M	2	1
	iv) Give the advantages and disadvantages of Induction type energy meters.	1M	2	
	v) Name the two common sources of error encountered during low resistance measurement.	1M	3	1
	vi) What is "Creeping" in an energy meter?	1M	3	1
	vii) What is the basic working principle of a Successive Approximation DVM?	1M	4	1
	viii) Compare Ramp type and Successive Approximation type in terms of speed.	1M	4	1
	ix) List three advantages of Electrical Transducers.	1M	5	1
	x) List the four main components of a PLC system.	1M	5	1
2(A)	Explain the construction and working principle of a Repulsion type Moving Iron (MI) Instruments with a neat diagram.	12M	1	2
	OR			
2(B)	Explain the basic structure and working principle of a Digital Multimeter (DMM) and discuss its advantages over analog multimeters in terms of input impedance and readability.	12M	1	2
3(A)	Describe the factors that affect the errors in Potential Transformers.	12M	2	2
	OR			
3(B)	Discuss the principle and operation of a Single-phase Induction Type Energy Meter with a neat internal diagram.	12M	2	2
4(A)	Discuss the principle of operation of a Megger and explain how it is used to measure high insulation resistance and describe its guard terminal's function.	12M	3	2
	OR			
4(B)	Explain the construction and working of a Schering Bridge for measuring an unknown capacitance and its dissipation factor. Derive the balance equations and draw the phasor diagram.	12M	3	2
5(A)	Discuss the construction and working of a Ramp Type Digital Voltmeter and explain the significance of the linear ramp and the two gates in the measurement process.	12M	4	2
	OR			
5(B)	Discuss how a Q-Meter can be used to measure Unknown Inductance (L), Effective Resistance (R) and Distributed Capacitance (Cd) of a coil.	12M	4	2
6(A)	Explain the construction and working principle of a Linear Variable Differential Transformer (LVDT) in detail.	12M	5	2
	OR			
6(B)	Explain the hierarchy and functional components of SCADA in detail.	12M	5	2

END

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
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B. Tech III Year II Semester (R23) Regular End Semester Examinations, May 2026

Microprocessors and Microcontrollers

(Department of Electrical and Electronics Engineering)

Time: 3Hrs

Max Marks: 70M

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.	Question	Marks	CO	BL
1.	i) Define microprocessor	1	1	1
	ii) What is pipelining in 8086?	1	1	1
	iii) What is the instruction format?	1	2	1
	iv) Define OFFSET directive	1	2	1
	v) What is the 8259 PIC?	1	3	1
	vi) What is memory interfacing?	1	3	1
	vii) What is an accumulator in 8051?	1	4	1
	viii) Define stack pointer	1	4	1
	ix) What is a UART?	1	5	1
	x) List two serial communication types	1	5	1
2(A)	(i) Draw the architecture of 8086 and explain the BIU and EU	6	1	2
	(ii) Explain segmentation and physical address calculation	6	1	2
	OR			
2(B)	Explain the minimum and maximum modes of the 8086 with comparison	12	1	2
3(A)	(i) Explain the addressing modes of 8086 with examples	6	2	3
	(ii) Describe the instruction formats of 8086	6	2	2
	OR			
3(B)	Write an ALP to find the largest number in an array and explain	12	2	3
4(A)	(i) Explain the interfacing of 8255 with 8086	6	3	2
	(ii) Construct a control word for 8255 in Mode 0	6	3	2
	OR			
4(B)	Explain the interfacing of ADC and DAC with the 8086 and applications	12	3	3
5(A)	(i) Draw the architecture of 8051 and explain the blocks	6	4	2
	(ii) Explain SFRs and PSW	6	4	2
	OR			
5(B)	Explain the instruction set of 8051 with examples	12	4	2
6(A)	(i) Explain serial communication in 8051	6	5	2
	(ii) Write steps for UART programming	6	5	2
	OR			
6(B)	Explain the interfacing of the stepper motor with the 8051 and applications	12	5	3

END

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B. Tech III Year II Semester (R23) Regular End Semester Examinations, May 2026

Power System Analysis

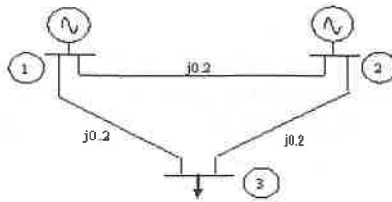
(Department of Electrical & Electronics Engineering)

Time: 3Hrs

Max Marks: 70M

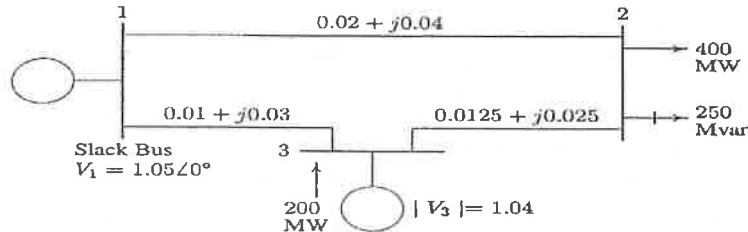
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.	Question	Marks	CO	BL												
1.	i) Convert an impedance of 10Ω to per-unit value on a base impedance of 20Ω	1	1	3												
	ii) What is the significance of choosing a common MVA base in a power system?	1	1	2												
	iii) Provide the formula for the new diagonal element Z_{pp} when adding a branch z_b from a new bus p to an existing bus i .	1	2	2												
	iv) State the impact on the matrix dimension when adding a new bus p to the reference bus.	1	2	2												
	v) State the "Decoupling" principle used in the Decoupled Load Flow method.	1	3	2												
	vi) Write the Static Load Flow equations.	1	3	2												
	vii) Justify, why the positive and negative sequences are the same for a transformer?	1	4	2												
	viii) State the properties of the rotational operator " a ".	1	4	2												
	ix) What is the significance of the "Inertia Constant" (H) in stability studies?	1	5	2												
	x) List two methods to improve Transient Stability.	1	5	2												
2(A)	A power system has the following impedances between the various buses: Bus 1 to reference $j2\Omega$ Bus 2 to reference $j2\Omega$ Bus 3 to reference $j2\Omega$ Bus 1 to bus 3 $j0.2\Omega$ Bus 2 to bus 3 $j0.4\Omega$ Bus 1 to bus 4 $j0.2\Omega$ Bus 2 to bus 4 $j0.2\Omega$ Bus 3 to bus 4 $j0.1\Omega$ Draw the configuration of the system and find the bus admittance matrix.	12	1	3												
OR																
2(B)	Explain in brief the procedure for formulation of Y_{bus} using singular transformation. Derive the necessary equations.	12	1	2												
3(A)	Form Z_{bus} by algorithm for the power system network, data for the network is given in the table below.	12	1	3												
<table><tr><th>Element</th><th>Bus Code</th><th>Impedance (p.u)</th></tr><tr><td>1</td><td>1-2</td><td>0.15</td></tr><tr><td>2</td><td>2-3</td><td>0.65</td></tr><tr><td>3</td><td>3-1</td><td>0.35</td></tr></table>					Element	Bus Code	Impedance (p.u)	1	1-2	0.15	2	2-3	0.65	3	3-1	0.35
Element	Bus Code	Impedance (p.u)														
1	1-2	0.15														
2	2-3	0.65														
3	3-1	0.35														
OR																
3(B)	(i) Develop an algorithm for the modification of bus impedance matrix when an element is added between a new bus and the reference bus.	6	2	3												
	(ii) State the properties of Y_{bus} matrix and justify why the matrix is highly sparse matrix?	6	2	2												
4(A)	Carry out for one iteration of load flow solution for the system shown in Figure by G-S method. Take Q limits of generator 2 as $0 \leq Q \leq 5$ p.u. Bus 1 slack bus $V_{\text{specified}} = 1.05 \angle 0^\circ$ Bus 2 PV bus $ V _{\text{specified}} = 1.00$ p.u., $P_G = 3$ p.u. Bus 3 PQ bus $P_D = 4$ p.u., $Q_D = 2$ p.u.	12	3	4												



OR

- 4(B) The single line diagram of a simple three bus system with generation at bus 1 in a sub-urban area is shown in figure. The magnitude of voltage at bus 1 is adjusted to 1.05 p.u. The scheduled loads at buses 2 and 3 are marked in the diagram. The line impedances are marked in p.u. on a 100 MVA base and line charging susceptances are neglected. 12 3 4

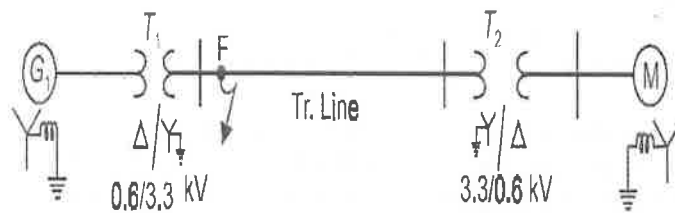


Using the NR method, determine the phasor values of voltages at bus 2 and 3.

- 5(A) (i) Given the voltage vectors of an unbalanced system as $V_a = 5\angle 53^\circ$, $V_b = 7\angle -164^\circ$, $V_c = 7\angle 105^\circ$, find the symmetrical components. 6 4 3
(ii) The symmetrical components of sub-transient current for a fault on a motor are as follows: $I_{a0}=0$ PU; $I_{a1}=0.2j$ PU and $I_{a2}=-0.2j$ PU. Identify the type of fault and calculate the fault current. 6 4 3

OR

- 5(B) The figure shows the single-line diagram of a sample power system, a double line to ground fault occurs on phases of b and c at the point F in the system. Find the fault current at the fault point. The machines are rated 1.2 MVA, 0.6 kV with $X_1=X_2=0.10$ PU and $X_0=0.05$ PU. Transformers are 1.2 MVA each with leakage reactance of 0.05 PU. Transmission line reactances are $X_{L1}=X_{L2}=0.20$ PU and $X_{L0}=0.4$ PU on the MVA base of machines. 12 4 4



- 6(A) (i) Determine the transient stability of a power system by equal area criterion. 6 5 2
(ii) A 50Hz, 3-phase synchronous generator delivers 1.0 PU power to an infinite bus bar through a network in which resistance is negligible. A fault occurs which reduces the maximum power transferable to 0.4 PU. Whereas before the fault this power was 1.8 PU and after the clearance of the fault 1.3 PU. By use of the equal-area criterion calculate the critical clearing angle. 6 5 2

OR

- 6(B) (i) Deduce the equation to find synchronizing power coefficient. 6 5 2
(ii) A 275 kV transmission line has following line constants. $A = 0.85\angle 50^\circ$, $B = 200\angle 75^\circ$. The line delivers 150 MW with $|V_S| = |V_R| = 275$ kV. Determine synchronizing power coefficient. 6 5 3

END

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
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B. Tech III Year II Semester (R23) Regular End Semester Examinations, May 2026

AI AND ML FOR ELECTRICAL ENGINEERING

(Department of Electrical and Electronics Engineering)

Time: 3Hrs

Max Marks: 70M

Attempt all the questions. All parts of the question must be answered in one place only.

All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.	Question	Marks	CO	BL
1.	i) Define rule-based system.	1	1	1
	ii) What is motivation for AI?	1	1	1
	iii) Define regression in Machine Learning.	1	2	1
	iv) What is classification in ML?	1	2	1
	v) Define ADALINE.	1	3	1
	vi) What is Hopfield network?	1	3	1
	vii) Define fuzzy logic controller.	1	4	1
	viii) What is a membership function?	1	4	1
	ix) List two AI applications in electrical engineering.	1	5	1
	x) Define load forecasting.	1	5	1
2(A)	Explain expert systems with block diagram and applications.	12	1	2
OR				
2(B)	Discuss rule-based systems and knowledge representation.	12	1	2
3(A)	Explain learning associations, classification and regression in Machine Learning.	12	2	2
OR				
3(B)	Discuss Gradient Descent and overfitting/underfitting issues.	12	2	2
4(A)	Explain different types of activation functions used in ANN.	12	3	2
OR				
4(B)	Explain the Perceptron Convergence Theorem in detail.	12	3	2
5(A)	Explain fuzzy properties, operations and relations.	12	4	2
OR				
5(B)	Explain classical sets and fuzzy sets with suitable examples.	12	4	2
6(A)	Explain AI techniques used in economic load dispatch.	12	5	2
OR				
6(B)	Discuss AI-based speed control of induction motor.	12	5	3

END

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B. Tech III Year II Semester (R23) Regular End Semester Examinations, May 2026

Switchgear and Protection

(Department of Electrical & Electronics Engineering)

Time: 3Hrs

Max Marks: 70M

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S. No.	Question	Marks	CO	BL
1.	i) Define Circuit Breaker.	1	1	1
	ii) What is the duty of CB under short-circuit conditions.	1	1	1
	iii) What is primary and back-up protection?	1	2	1
	iv) Define single-input comparator.	1	2	1
	v) Define overheating protection of transformer.	1	3	1
	vi) What is CT's ratio.	1	3	1
	vii) What are the types of feeders?	1	4	1
	viii) Define differential pilot wire protection	1	4	1
	ix) What do you mean by Valve type lightning arrestors?	1	5	1
	x) What are the various methods of Neutral grounding?	1	5	1
2(A)	Explain Current Chopping and resistance switching with examples.	12	1	2
	OR			
2(B)	Describe Plain-break Oil Circuit Breaker with neat sketches.	12	1	2
3(A)	Illustrate the zones of protection with neat sketch.	12	2	2
	OR			
3(B)	Explain in detail about the stepped distance characteristics of a distance relay.	12	2	2
4(A)	Explain about the protection of generators against rotor faults.	12	3	2
	OR			
4(B)	Explain about the protection of Transformers with neat sketches.	12	3	2
5(A)	Explain about the protection of feeders with neat diagrams.	12	4	2
	OR			
5(B)	Explain about the frame leakage protection of busbar.	12	4	2
6(A)	Explain about the protection against lightning over voltages with neat sketches.	12	5	2
	OR			
6(B)	Explain the neutral grounding with detailed block diagrams.	12	5	2
	END			