	InSem Examination-I Winter 2023		
	Exam Seat No.:		
	Academic Year: 2023-2024	Semester: III	
	Name of Programme: S.Y.B.Tech Electrical Engineering	Pattern: 2022	
	Name of Course: Measurement and Instrumentation	Course Code: ELE222003	
	Max. Marks: 30	Duration: 1 Hour	

	Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use. 1. This question paper contains 02 page(s). 2. Answer to each new question is to be started on a new page. 3. Assume suitable data wherever required, but justify it. 4. Draw the neat labelled diagrams, wherever necessary. 5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question	

Question No. 1 Attempt following Question

a) Define following characteristics of measuring instruments.

(i) Accuracy   (ii) Precision   (iii) Dead zone   (iv) Response time   (4)   CO1

OR

b) State the following statement is true or false with justification:

The pointer in measuring instrument is steady when controlling torque is greater than deflecting torque.   (4)   CO1

c) State the difference between PMMC and MI type instruments on following points:

(i) Working principle   (ii) Construction   (iii) Area of application   (5)   CO2

OR

d) Draw the diagram Electrodynamometer type instrument and derive torque equation.   (5)   CO2

e) List the different types of error in measuring instruments? Explain any two in details. (6) CO1

OR

f) What is the necessity of CT and PT in measuring instruments? How the range of a wattmeter can be extended using CT and PT. (6) CO1

Question No. 2 Attempt following Question

a) Suggest the methods or instruments for following measurement

(i) Three phase power measurement in unbalanced load. (4) CO4

(ii) Reactive power measurement.

OR

b) Three meters (i) 10A, 300V (ii) 5A, 600V (iii) 10A, 150V is given to you. Suggest the suitable meter from above for following loads with justification. (4) CO4

1) 1800W, 200V load   2) 1000W, 100V load

c) Show that in two wattmeter method

$$phase\ angle\ \emptyset = \tan^{-1}\left(\sqrt{3}\frac{P1-P2}{P1+P2}\right)$$

(5) CO4

OR

d) Derive the power equation and write in brief about one wattmeter method using two way switch for measurement of power in 3 phase system. (5) CO4

e) Two wattmeter connected to measure the input to a balance 3 phase circuit indicates 2000W and 500W respectively,

Find power factor of circuit, a) When both the reading are positive and (6) CO3

b) When the latter reading is obtained after reversing the connection to the current coil of second instrument.

OR

f) A wattmeter has a current coil 0.1 ohm resistance and a pressure coil of 6500 ohm resistance. Calculate the percentage error due to resistance only with each of the two method of connection when reading the input to an apparatus which takes, (6) CO3

 i) 12 A at 250 V with unity power factor and ii) 12 A at 250 V and 0.4 p.f.