BT SH-III(R/S)-11.22-2048 Reg. No. | | | | | | | | | | B

B.Tech. Degree III Semester Regular/Supplementary Examination in Naval Architecture and Ship Building November 2022

20-215-0304 INSTRUMENTATION

(2020 Scheme)

Time: 3 Hours Maximum Marks: 100

Course Outcome
On successful completion of the course, the students will be able to:

CO1: Understand the basics of instrumentation, standards, calibration and errors in measurement.
CO2: Understand the basic working principle and classification of transducers for measurement of displacement, strain, force and pressure.
CO3: Explain the working principle, construction and features of various temperature measuring instruments.
CO4: Explain the working principle, construction and features of various pressure, flow, and humidity measuring instruments.
CO5: Explain the concepts and terminology of digital instrumentation.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
PO – Programme Outcome

PART A

(Answer *ALL* questions)

			Marks	BL	CO	PO
		(5 × 4 = 20)				
I.	(a)	Distinguish between null type and deflection type instruments with an example	4	L1	1	1
	(b)	For metallic strain gauges gauge factor G = 1 + 2U where U is poisons ratio. Derive and justify the statement.	4	L3	2	1
	(c)	Write the principle behind RTD. Explain the reasons why platinum metal is used in construction of RTD.	4	L2	3	1
	(d)	Elaborate how float is used in liquid level measurement.	4	L2	4	1
	(e)	Write short note on LED.	4	L1	5	1

PART B

(Draw neat diagrams wherever applicable)

(5 × 16 = 80)

			Marks	BL	CO	PO
II.	(a)	Discuss about the following static characteristics with example (i) Accuracy and Precision (ii) static error (iii) drift.	8	L2	1	1
	(b)	What is calibration? Explain the need for calibration and different standards available for calibration.	8	L2	1	1
		OR				
III.	(a)	What do you mean by errors in measurement? Explain Systematic errors in detail and the possible methods to eliminate these errors.	10	L2	1	1
	(b)	Write short note on different standards of measurement.	6	L1	1	1

(P.T.O.)

			Marks	BL	CO	PO
IV.		Explain the construction, principle, working and applications of LVDT. Explain with a neat sketch, any one example where LVDT can be used as a secondary transducer.	16	L3	2	1
		OR				
V.		What is a strain gauge? Discuss types of strain gauge. Explain resistance strain gauge bridge bridges when balanced and unbalanced condition on the application of strain.	16	L2	2	1
VI.		Explain the laws, materials used, construction, principle, working, advantages and limitations of thermocouple. Explain the need of reference junction. How reference junction temperature is maintained in thermocouple.	16	L3	3	1
		OR				
VII.		What is a pyrometer? Where will you use pyrometers? Explain with a neat sketch the working of optical pyrometer.	16	L2	3	1
VIII.	(a)	Explain any one method of vacuum pressure measurement.	8	L1	4	1
	(b)	Explain the construction and working of bourdon tube gauge for pressure measurement and their applications.	8	L2	4	1
		OR				
IX.		With neat sketches, explain the liquid level measuring instruments using Gamma rays, ultrasonic methods and hydrostatic pressure head.	16	L1	4	1
X.		What is the need of ADC and DAC? Explain successive approximation type and counter type ADC. Compare them.	16	L2	5	1
		OR				
XI.		Write short notes on: (i) CRT (ii) Introduction to microcontrollers.	16	L1	5	1

Bloom's Taxonomy levels
L1- 30%, L2 – 50%, L3 – 20%.

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