

Registration No. :

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Total number of printed pages – 2

B. Tech
PECH 5304

Fifth Semester Regular Examination – 2014

PROCESS INSTRUMENTATION

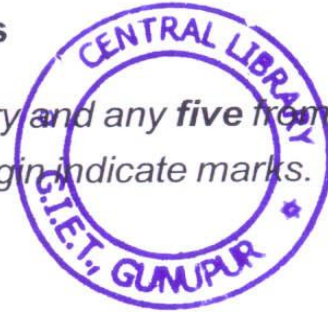
BRANCH : BIOTECH

QUESTION CODE : H 218

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any five from the rest.
The figures in the right-hand margin indicate marks.*



1. Answer the following questions :

2 × 10

- State the type of level switches.
- What is the air purge system ?
- What are the types of inferential flow meters ?
- How will measure the mass flow rate ?
- What are steps involved in calibrating a thermometer ?
- Of what use are the absolute temperature scales ?
- What will be the gauge pressure and absolute pressure at the depth of 35 m in water tank ? Express them in kg/cm^2 and mm in Hg.
- What are the different units are used for pressure measurements ?
- Calculate the buoyancy force on an object that displaces 5 m^3 of water at 20°C .
- Define quantity flow meters.

2. A Displacer with area of cross-section 5 cm^2 , length 8 m and specific gravity 6 is used for measuring water level in a tank of maximum level 8 meters. The displacer

P.T.O.

is weighted with spring balance directly. Also the displacer is used to measure the level from bottom of the tank.

- (a) Find out the levels when the spring balance reads (i) 23, (ii) 22 and (iii) 21 kgs. 5
- (b) What does the spring balance read when the tank is full? 5
3. Consider an electromagnetic flow meter which is used to measure volumetric flow of a process fluid in a pipe of 60 mm dia. The velocity profile is symmetrical and can be assumed uniform. The flux density in the liquid is 0.1 Wb/square meter. The output from the flow meter is given to an amplifier of gain 1000 and impedance between the electrodes is 275 Kilo-ohms. The input impedance of the amplifier is 275 Kilo-ohms. Find the average velocity of the liquid when the P-P voltage at the amplifier output is 0.3 V. 10
4. (a) Describe the operation of the air bubbler level measurement system. 5
- (b) Explain briefly about the selection of a flow meter. 5
5. (a) Water is pumped through a 75 mm diameter pipe with a flow velocity of 760 mm/sec. Find the volume flow rate and mass flow rate. Density of water is 1000 kg/m^3 . 5
- (b) What is pyrometer? Explain the working principle of pyrometer. 5
6. (a) Convert the temperature -40 degree Celsius to others scales. What is accuracy of measurement? For a 1% accuracy meter whose span is 1000 degree Celsius? What is the probable error at any point of scale? 5
- (b) What are the differences between a motion balance and a force balance systems? 5
7. (a) Describe the operation of the air bubbler level measurement system. 5
- (b) Discuss the Angular-Momentum-Type mass flow meters. 5
8. Write short notes on any **two** : 5×2
- (a) Mass spectroscopy
- (b) Hook-type level indicator
- (c) Force-balance pressure gauges
- (d) Filled System thermometers.