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EE 1818 PE 73

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Roll No. of candidate

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BINA CHOWDHURI  
(GMT & GIPS)  
Azara, Hatkhowapara,  
Guwahati - 781017

2022

B.Tech. 8<sup>th</sup> Semester End-Term Examination

POWER SYSTEM INSTRUMENTATION

New Regulation (w.e.f 2017-18) &

New Syllabus (w.e.f. 2018-19)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)
- (i) The deflection of hot wire instruments depends on
- (a) Instantaneous value of alternating current  
(b) Average value of current  
(c) r.m.s value of alternating current  
(d) none of the above
- (ii) Creeping is the phenomenon that occurs in
- (a) Voltmeter                      (b) Energy meter  
(c) Watt meter                      (d) Ammeter
- (iii) The internal resistance of the ammeter should ideally be
- (a) Zero                              (b) Very large  
(c) Very small                      (d) Infinite
- (iv) The unit of deflection sensitivity of a CRO is
- (a) metre/volt                      (b) mm/volt  
(c) mm/m-volt                      (d) m/m-volt

[Turn over

- (v) C.T. and P.T. are used for \_\_\_\_\_.
- (a) measuring low current and voltages
  - (b) measuring very low current and voltages
  - (c) measuring high currents and voltages
  - (d) measuring intermediate currents and voltages
- (vi) Telemetry allows data flow in \_\_\_\_\_.
- (a) Single direction
  - (b) Both direction
  - (c) Depend on design
  - (d) None of the mentioned
- (vii) Boiler is an important unit of \_\_\_\_\_.
- (a) Nuclear power plant
  - (b) Hydroelectric plant
  - (c) Coal fired thermal power plant
  - (d) Diesel power plant
- (viii)  $VI \sin \phi$  is called \_\_\_\_\_.
- (a) Active power
  - (b) Reactive power
  - (c) DC power
  - (d) AC power
- (ix) 'Shrinking and Swelling' phenomena is observed in \_\_\_\_\_.
- (a) Turbine
  - (b) Generator
  - (c) Cooling tower
  - (d) Boiler drum
- (x) Which of the following represents telemetry?
- (a) Fetching data from inaccessible point
  - (b) Fetching data from accessible point
  - (c) Communication over telephone
  - (d) None of the mentioned

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2. (a) Explain the working of Moving Iron Voltmeter. Show that this type of instrument can be used for both ac. and d.c. measurement. (8 + 2 = 10)
- (b) A moving coil instrument has a 1.5 cm wide and 1.2 cm long. The flux density in the air gap is  $1.8 \times 10^{-3}$  wb/m<sup>2</sup>. The spring constant is  $1.4 \times 10^{-7}$  N-m/radian. Determine the number of turns required to produce an angular deflection of 90° when a current of 5 mA flows through the coil. (5)
3. (a) Draw the block diagram of a digital frequency meter and briefly explain its operation. (7)
- (b) Explain the measurement of high voltage using the different types of potential divider circuit. (8)
4. (a) How is the water level in a boiler drum measured? What is 'shrinking' and 'swelling' in boiler drum. How does it affect the measurement of boiler drum level? (7)
- (b) Briefly explain the measurement of
- (i) smoke density
- (ii) dust particles. (4 + 4 = 8)
5. (a) Draw the basic block diagram and waveform for a digital storage oscilloscope (DSO) for sampling a waveform and storing the information. Explain the operation using the block diagram. (10)
- (b) Write a short note on Phasor measurement unit (PMU). (5)
6. (a) What is Telemetry? Explain briefly the different components of a telemetry system and mention the advantages of telemetry system. (2 + 4 + 2 = 8)
- (b) What is PLCC? Distinguish between a three line and two line electrical type transmitter. What type of variable does it transmit? (2 + 3 + 2 = 7)
7. (a) What is SCADA? Distinguish between DCS and SCADA. (3 + 4 = 7)
- (b) Using Block diagram, discuss about the SCADA system used in a typical power system. (8)

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