Reg. No. :

Question Paper Code: 52912

M.E. DEGREE EXAMINATION, JUNE 2016

Elective

CAD / CAM

15PCD510 - METROLOGY AND NON DESTRUCTIVE TESTING

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Metrology is defined by

   (a) BIPM   (b) BIBM   (c) BIPN   (d) none of these

2. Process capability compares the output of an _____process.

   (a) out-control   (b) in-control   (c) controlled   (d) all the above

3. The magnetic particle method of non-destructive examination are

   (a) quick and non-relatively uncomplicated
   (b) quick and relatively complicated
   (c) quick and relatively uncomplicated
   (d) none of these

4. X-rays have a wavelength ranging from _____ nanometers.

   (a) 0.01 to 10   (b) 0.01 to 5   (c) 0.10 to 10   (d) 0.01 to 0.5

5. A wave can be _____

   (a) transverse   (b) longitudinal   (c) both a and b   (d) none of these

PART B - (5 x 3 = 15 Marks)

6. State the advantages of tool maker's microscope and indicate its applicability for measurements.

7. Classify sampling methods and state the characteristics of any one of them.

8. List any four the characteristics of liquid penetrants.

9. Mention any three applications for radiography and its advantages.

10. State general characteristics of waves and how are they classified.

PART C - (5 x 16 = 80 Marks)

11. (a) By citing an application, explain the role of laser for profile verification in a manufacturing scenario. (16)

Or

(b) With block diagram, explain the implementation of machine vision system for non-contact dimensional measurement. (16)

12. (a) A copper content of bronze coatings has target value of 80. The standard deviation is known to be 4%. During the production process, samples of size 6 are taken at regular intervals and their copper content measured.

(i) Calculate upper and lower warning and action limits for control charts for means and standard deviations.

(ii) The following results were obtained from samples on three separate occasions.

	1	2	3	4	5	6
I	82.0	83.5	79.8	84.2	80.3	81.0
II	75.8	68.4	80.3	78.2	79.9	73.5
III	79.5	80.0	79.9	79.6	79.9	80.4

(iii) If the process currently has a mean of 76% with a standard deviation of 4%, what is the probability that mean of the next sample will lie within the limits? (16)

Or

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(b) Classify reliability testing methods and discuss their significance in industrial applications. (16)

13. (a) Explain the various methods for producing magnetic fields by stating principle and applications for each of them. (16)

Or

(b) With a neat sketch, explain the principle of operation of magnetic particle test and its suitability of use in an industrial environment. (16)

14. (a) State the X-ray film characteristics and discuss the effect of contrast in exposure charts. (16)

Or

(b) Describe the operational characteristics of X-ray equipment for internal defect detection with neat sketch and mention any two applications. (16)

15. (a) With suitable diagrams, describe the implementation proposal of pulse echo method for defect detection. (16)

Or

(b) Explain the instrumentation arrangement of acoustic emission technique with suitable flow diagram. (16)

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