GANPAT UNIVERSITY

M.Tech. Sem. II Mechanical Engineering (CAD/CAM)

May – June 2012

3ME215 - Automation in Production & Quality Engineering

Time: 3 Hours Total Marks: 70

Instructions: (1) Answers of two sections must be written in the separate answer book.
(2) Draw neat sketches wherever necessary.
(3) Assume suitable additional data wherever necessary.

SECTION – I

Q-1 (a) What is reliability? Discuss how reliability of a product or service can be improved. [11]

(b) What is benchmarking? Why benchmarking is necessary? Discuss the steps involved in implementation of benchmarking.

OR

Q-1 (a) With the help of illustrations, differentiate between the following. [11]
(i) Chance & Assignable causes
(ii) Natural tolerances & Specification limits

(b) The following data were obtained from a process manufacturing power suppliers. The variable of interest is output voltage. Subgroup size $n = 5$, $d_2 = 2.326$

Sample No.	1	2	3	4	5	6	7	8	9	10
X	103	102	104	105	104	106	102	105	106	104
R	4	5	2	11	4	3	7	2	4	3

Sample No.	11	12	13	14	15	16	17	18	19	20
X	105	103	102	105	104	105	106	102	105	103
R	4	2	3	4	5	3	5	2	4	2

(i) Compute the centre line & control limits of X & R chart for controlling future production.

(ii) Calculate process capabilities C_p & C_{pk} and what conclusions can you draw about ability of the process to produce products within specifications limits?

Q-2 (a) Discuss the Eight Dimensions of Quality as suggested by David Garvin. [12]

(b) What is Statistical Process Control? Discuss the procedure for measurement of process capability of a machine tool.

(c) What is Pareto diagram? Explain the importance of cause and effect diagram in process improvement.

OR

Q-2 (a) What is Acceptance Sampling? With reference to OC Curve Explain (i) Producer's Risk (ii) Consumer's Risk (iii) AQL (iv) LTPD [12]

(b) Differentiate between quality of design, quality of conformance & quality of performance.

(c) "Variability is an enemy of quality". Justify the statement giving appropriate examples.

Q-3 **Write short notes on any three.** [12]

(a) ISO 9000 & ISO 14000
(b) Reverse Engineering
(c) Taguchi method
(d) Six Sigma

SECTION II

Q-4 **(a)** Describe relationship between Product variety and Production quantity with example? **[12]**
(b) Why Hydraulic is more efficient than Pneumatic, Explain with suitable example.
(c) What is Sensor? Explain Sensor used in Automated manufacturing.

OR

Q-4 **(a)** Why PLC system as more preferable in Automated manufacturing system? **[12]**
(b) What is the relation between Automation and CIM? Explicate reasons to justify the use of Automation.
(c) Suggest Application of power sources (Hydraulics or Pneumatics) and reason for it.

- Automobile wheel changing.
- To handling Pre-cast RCC underground bridges.
- Sheet metal punching
- Robot Gripper
- In forging industries

Q-5 **(a)** Enlist basic components of Hydraulic system. And Explain all components. **[11]**
(b) Briefly Explain Pressure relief valve. Draw the symbols for Pressure relief valves used in Hydraulics.
(c) What are the characteristics of a Hydraulic fluid?

OR

Q-5 **(a)** How many type of miscellaneous sensor? Describe it. **[11]**
(b) What are the strategies for Automation?
(c) What is a mechatronics system? How it integrates various discipline of engineering explain with an example?

Q-6 **Answer Any Three.** **[12]**
(a) Explain working principle of Inductive and Capacitive proximity sensor with neat sketch.
(b) What do you mean by close loop control system? Explain servo motor.
(c) What is LVDT? Draw internal circuit diagram of LVDT.
(d) What is PLC? Advantage of PLC and draw the block diagram of PLC.