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NEW SCHEME

ME71

Reg. No.

nth Semester B.E. Degree Examination, January/February 2006

Mechanical Engineering

Total Quality Management

(Max.Marks : 100

:: 3 hrs.)

Note: 1. *Answer any FIVE full questions.*
2. *Use of SQC tables permitted.*

1. (a) Explain contributions made by any two quality Gurus.

   (b) Explain the concept of internal customer and external customer with example.
   (12 Marks)

   (8 Marks)

2. (a) Explain problem solving methods.
   (12 Marks)

   (b) Describe process of bench marking.
   (8 Marks)

3. (a) Explain ISO - 9000 series of standards.
   (12 Marks)

   (b) State the benefits of QFD.
   (8 Marks)

4. (a) Explain the design FMEA (Failure mode & effect analysis) document.
   (12 Marks)

   (b) Explain control charts for variables & attributes.

5. (a) Explain the following with examples

   i) Scatter diagram

   ii) Histogram
   (8 Marks)

   (b) Construct a control chart for mean & range of the following data on the basis of fuses, samples of 5, being taken every hour (each set of 5, has been arranged in ascending order of magnitude). Comment on the state of control, assuming that these are the first data.

42	42	19	36	42	51	60	18	15	69	64	61
65	45	24	54	51	74	60	20	30	109	90	78
75	68	80	69	57	75	72	27	39	113	93	94
78	72	81	77	59	78	95	42	62	118	109	109
87	90	81	84	78	132	138	60	84	153	112	136

   (12 Marks)

6. (a) i) Distinguish between defect and defective

   ii) Explain requisites for good sampling plan.
   (8 Marks)

(b) Using each day's production as the day's sample draw a control chart for fraction defectives on the basis of the proportion of defective castings produced in 10 days tabulated below, and comment on the results.

Days	1	2	3	4	5	6	7	8	9	10
No. of castings produced	154	152	148	150	154	145	151	154	150	153
No. of castings found defective	4	2	2	4	3	4	2	2	1	4

(12 Marks)

7. (a) Define reliability. Explain four elements of the reliability. (8 Marks)

(b) A single sampling plan has n=110, C=3. The lot size is large compared to sampling size. Plot the OC curve and find the values of LTPD for which probability of acceptance are 0.95, 0.50 and 0.10 respectively. (12 Marks)

8. Write short notes on

a) Benefits of TQM

b) Re-engineering

c) Thaguchi philosophy of quality engineering

d) Six sigma (5 x 4 Marks)

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NEW SCHEME

Seventh Semester B.E. Degree Examination, Dec.06 / Jan.07
Mechanical Engineering
Total Quality Management

[Time: 3 hrs.]   [Max. Marks:100

Note: *1. Answer any FIVE full questions.*
        2. Use of SQC tables is permitted.

1. a. Define TQM. Explain briefly the contributions of Guru's of TQM.   (14 Marks)
   b. Explain TQM frame work with illustration.   (06 Marks)

2. a. Which factors are responsible for customer's satisfaction?   (06 Marks)
   b. Explain Deming Philosophy.   (14 Marks)

3. a. Define Bench marking. List out the benefits of ISO registration.   (08 Marks)
   b. Bring out the salient features of quality function deployment and quality by design.   (12 Marks)

4. a. Explain seven basic tools of SPC.   (14 Marks)
   b. Ten samples of five pieces each were taken at regular intervals. The sample averages and ranges are shown the following table :

Sample Number	1	2	3	4	5	6	7	8	9	10
$\overline{X}$	7.478	7.488	7.498	7.498	7.498	7.498	7.504	7.506	7.512	7.518
R	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02

Calculate the control limits for $\overline{X}$ and R charts, represent the same on the chart. Comment on the state of process.   (06 Marks)

5. a. Explain the different control charts for attributes.   (10 Marks)
   b. Construct a control chart for number of defectives from the following data :

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Number of Defective	32	20	16	20	24	42	30	36	36	52	28	24

Note : All the 12 samples have a sample size 400 each.   (10 Marks)

6. a. Discuss the significance of acceptance sampling. List the types of acceptance sampling.   (08 Marks)
   b. Explain the O.C. curves for ideal and actual situation with suitable illustration.   (12 Marks)

7. a. Write the standard configurations for reliability when the systems are in i) series. ii) parallel. Determine the reliability of the systems.   (10 Marks)
   b. Explain Taguchi's signal to noise ratio.   (10 Marks)

8. Write short notes on:
   a. Failure mode and effect analysis.
   b. Jurans Trilogy.
   c. Factorial design.
   d. Re-engineering.   (20 Marks)

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6 c. Select the suitable control chart for the following data and compute 3σ control limit

Air Craft No.	101	102	103	104	105	106	107	108	109	110
No. of missing rivets	8	10	12	19	15	11	08	21	05	30

(04 Marks)

7 a. Explain double sampling plan. (06 Marks)
   b. A single sampling plan has the following parameters N = 4000, n = 75, C = 2.
      i)   Construct the OC curve for single sampling plan.
      ii) If AQL = 1.5%, find producers risk.
      iii) If consumer risk is 10%, find the LTPD.
      iv) Determine the AOQL of the plan under acceptance rectification scheme.
      (14 Marks)

8 a. Explain with neat sketch failure rate curve. (06 Marks)
   b. A device has a failure rate of $5 * 10^{-6}$ failures/hr.
      i)   What is the reliability for operating period of 100 hrs?
      ii) What is MTBF?
      iii) What is the reliability of system for an operating period of MTBF? (06 Marks)
   c. Explain
      i)   Steps in designing an experiment.
      ii) Principles of an experimental design. (08 Marks)

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NEW SCHEME

Seventh Semester B.E. Degree Examination, May 2007
Mechanical Engineering
Total Quality Management

(10 [e: 3 hrs.]

Note : 1. Answer any FIVE full questions.
 2. Use of SQC Tables permitted.

[Max. Marks:100

M1 a. 'TQM requires a cultural change' Explain.
 b. Explain six basic concepts of TQM.
 c. Sketch and explain TQM framework.

(06 Marks)
(08 Marks)
(06 Marks)

 a. Explain characteristics of quality leaders.
 b. Explain ASQ's customer perception of quality.
 c. Write a note on Juran's Trilogy.

(06 Marks)
(08 Marks)
(06 Marks)

 a. Explain with a neat sketch continuous process improvement cycle.
 b. Explain ISO-9000 series of standards.
 c. Explain six-sigma quality.

(08 Marks)
(08 Marks)
(04 Marks)

 a. Write a note on process of Benchmarking.
 b. List and explain the steps which are essential in the preparation of FEMA document.
 c. Write a note on Kaizen.

(08 Marks)
(08 Marks)
(04 Marks)

 a. Explain with neat sketch the following QC tools:
    i) Pareto diagram.
    ii) Cause and effect diagram.

(08 Marks)

 b. A machine is producing a product to a specification of 12.58 ± 0.05 mm. A study of the process exhibits statistical control, 10 subgroups of size 5 each shows the following results. $\overline{\overline{X}} = 12.598$, $\overline{R} = 0.055$. If
    i) Determine Cp and Cpk and comment on the process.
    ii) Compute percentage non-conformity if any.
    iii) Suggest the possible ways to improve the process.

(12 Marks)

 Differentiate between:
    i) P and nP chart.
    ii) C and U chart.

(08 Marks)

 A large number of samples of 200 items each are taken from a process that has percentage of nonconformity of 10%.
    i) What is the expected number of nonconforming items/sample?
    ii) Compute 3σ control limits of chart selected for the process.
    ii) If P" remains unchanged what is the probability that next sample taken from the process contain exactly 10 defective.
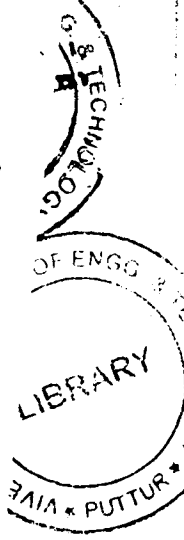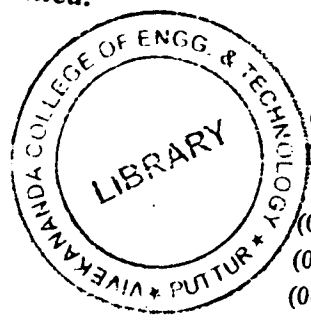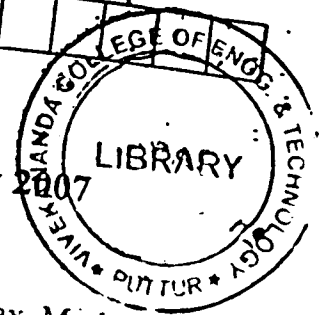
(08 Marks)

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7   a. Distinguish between type 'A' and type 'B' OC – curve.
    b. With the help of block diagram, explain double sampling plan.
    c. A single sampling plan is as follows : $N = 4000, \ n = 75, \ c = 2$.
        i)   Plot OC – curve
        ii) If AQL is 1.5%, find producers risk.
        iii) If consumers risk is 10%, find rejection quality level.
        iv) Find ATI at 1.5% defective

(10 Marks)

(06 Marks)
(06 Marks)

8   a. Write a note on design for reliability.
    b. Explain in brief signal to noise ratio.
    c. A series system has three independent parts namely A, B and C which have a MTBF of
        100, 400, 800 hours respectively.
        Find :
        i)   MTBF of system.
        ii) Failure rate of the system in failures/million hours.
        iii) Failure rate of system in percent failures/1000 hrs.
        iv) Reliability of system for 30 hours.

(08 Marks)

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Seventh Semester B.E Degree Examination, Dec. 07 / Jan. 08
Total Quality Management

Time: 3 hrs.   Max Marks:100

Note : 1. Answer any FIVE full questions.
2. Use of statistical tables is permitted.

1.   a. Explain in brief six basic concepts of Total Quality Management   (06 Marks)
    b. Explain in brief the contribution of GURUS of TQM.   (08 Marks)
    c. List the quality of a good leader.   (06 Marks)

2.   a. Enumerate Deming's 14 principles and explain any two of them.   (10 Marks)
    b. Explain in brief what kind of information can be obtained from customer feedback.   (04 Marks)
    c. Explain Jurans quality trilogy in continuous improvement.   (06 Marks)

3.   a. Write a note on 'Reengineering'.   (06 Marks)
    b. Explain briefly the structure of ISO-9000 series.   (08 Marks)
    c. List the advantages of 'quality by design'.   (06 Marks)

4.   a. Explain in brief different levels of 'Bench marking'.   (08 Marks)
    b. Write a note on documentation of ISO-9000.   (08 Marks)
    c. Distinguish between 'Inspection' and 'Quality control'.   (04 Marks)

5.   a. Explain in brief the 'control limits' and specification limits.   (06 Marks)
    b. Subgroups of four items each are taken from a manufacturing process at regular intervals. A certain quality characteristic is measured and $\overline{X}$ and R values are computed for each subgroup After 25 subgroups $\sum \overline{X} = 15350$ and $\sum R = 411.4$.   (14 Marks)

      i)   Compute 3σ control limits for $\overline{X}$ and R chart.
      ii)   Compute population values assuming the process to be under state of statistical control.
      iii)   If specification limits are 610 ± 15, what percentage of products meets specifications.
      iv)   If undersized products cannot be reworked, to what minimum value the process average can be increased, so that there are no rejections because of undersize.

6.   a. List the differences between control charts for variables and attributes.   (06 Marks)
    b. Ten samples of size 50 are inspected from a manufacturing process and the inspection data is given below. Prepare np – chart and offer your comments. Revise control limits if necessary.   (06 Marks)

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defectives in the sample	02	01	04	00	02	01	02	01	01	00

    c. Ten samples of a product are drawn from a manufacturing process and are inspected to find the number of defects in each sample. The inspection results are tabulated below. Prepare C – chart and offer your comments. What value of C' you would recommend for future period.   (08 Marks)

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defects in sample	24	23	13	32	17	22	26	17	20	22

(b) Write short notes on
  i) Collector efficiency factor
  ii) Effect of selective surface on the performance of flat plate collector. (8 Marks)

5. (a) Calculate the optimum tilt angle for a flat plate collector facing due south and located at Bombay ($19.12^0 N$), if the insolation falling over the month from September to December is to be maximised. Use the following data

Month	September	October	November	December
$H_g(kWh/m^2 - day)$	4.878	5.443	5.074	4.794
$H_d(kWh/m^2 - day)$	2.860	1.982	1.193	1.106
Representative				
day of the month	15	15	14	10

(12 Marks)

(b) Explain the method to find out the transmissivity of flat plate collector with two glass covers. (5 Marks)

6. (a) Explain the working principle of OTEC system. (6 Marks)

(b) A wind mill with diameter 20 meters is operating at its maximum efficiency. The wind velocity is 12 m/s at standard atmospheric conditions. Calculate
  i) Total power density in the wind stream
  ii) Maximum obtainable power density
  iii) Actual power developed if $C_p = 0.35$. (6 Marks)

(c) With a neat sketch explain horizontal axis windmill. (8 Marks)

7. (a) Write a note on the applications of biogas. (6 Marks)

(b) Write a note on anerobic fermentation of bio waste. (6 Marks)

(c) Briefly discuss the major geothermal plants in the world. (8 Marks)

8. Write short notes on the following :
  i) Applications and merits of hydrogen energy
  ii) Electrolysis of water
  iii) Wave energy utilization
  iv) Storage of hydrogen (20 Marks)

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