B.E. (Mechanical Engineering) Seventh Semester (C.B.S.)

Industrial Engineering

P. Pages : 3 **NIR/KW/18/3551**

Time : Three Hours * 1 8 2 7 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.
13. $\overline{X}$ & R chart Tables are permitted.

1. a) Explain the various tools & techniques to improve productivity. **8**

b) Define method study. Describe the objectives of conducting method study. **6**

OR

2. a) Define work study. What are the components of work study. **6**

b) Draw the flow process chart for welding of two metal pieces in workshop. Assume suitable data. **8**

3. a) Explain the various steps involved in time study. **6**

b) What is work sampling? What are its merits and limitations? **7**

OR

4. a) A work sampling study of a Laboratory technician over a one week period (40 hours) yielded the following data: - **7**

Total sand samples analyzed = 900
Idle time = 30%
Performance Rating = 90%

a) Determine the required number of samples in order to obtain 95% confidence & $\pm 5\%$ precision level.

b) If allowance for this particular type of work total to 10%. Determine the standard time per sand sample.

b) For a particular Job element 20 observations were taken by a time study analyst. Check whether these number of observation are sufficient for 50% accuracy with 95% confidence level. Determine the minimum number of readings required. **6**

Time (X) in min	0.06	0.07	0.08	0.09	0.10
Frequency (f)	2	3	10	3	2

5. a) The sale of physics Book of XYZ publication for 12th standard is as given below. **6**

No. of students appeared for examination (in lakhs)	No. of copies sold (In thousands)
3.5	70
4.0	72
4.2	75
5.8	80
6.0	82

Find a linear regression equation & Estimate demand for physics book with 8 lakh students appeared for examination.

b) The sales of fans of ABC company for last 8 quarters is as:- **7**

Year	Jan-Mar	Mar-Jun	Jun-Sept	Sept-Dec
1998	800	2000	1500	750
1999	850	2200	1600	800
2000	900	?	?	?

a) Plot a graph to show the seasonal pattern.
b) Prepare secular trend values from the above figure.
c) Find out magnitude of seasonal variations.
d) Forecast demand for the year (2000) for all the quarters.

OR

6. a) Explain the qualitative techniques of forecasting with suitable example. **6**

b) Estimate the sales forecast for the year 1992. Using exponential smoothing take $\alpha = 0.3$ **7**

Year	1984	1985	1986	1987	1988	1989	1990	1991
Sales (Rs. X 100)	180	168	159	170	188	205	190	210

Take the sales forecast of year 1984 as Rs. 16000/- plot the actual sales and forecast the values on a suitable graph.

7. a) Define maintenance. Explain various types of maintenance. **6**

b) Explain Bath tub curve with suitable examples. **7**

OR

8. a) Define MTBF, MTTR and MTTF with examples. **6**

b) A system is composed of three components each component has an exponential time of failure distribution with constant failure rate of 0.5 per 4000 Hrs. Compute component reliability and system reliability for 2000 hrs of operation if components are connected in series. **7**

9. a) What is quality? What do you understand by quality control? What are the various objectives of quality control? **8**

b) What is process capability? Explain Operating Characteristics (OC) curve with a neat **6**

OR

10. a) What is the significance of quality of design & quality of conformance? Describe the factors controlling both. **6**

b) A component with specification limit is given as 17.5 ± 0.23 where inspection. The components were taken subgroup of 4 items. After 20 subgroups, the values of $\overline{X}$ and R. Were found to be $\Sigma\overline{X} = 350$ and $\Sigma R = 8.5$. **8**

Assuming the process in control what conclusion would you draw about the ability of process to produce the item within specified limits.
(Assumed $d_2 = 2.059$, $D_3 = 0$, $D_4 = 2.28$)

11. a) Explain the following in detail. **6**

i) Quality Assurance ii) Quality planning.
iii) Quality audit.

b) What is TQM. Explain the principles of TQM. **4**

c) Explain the philosophy of six sigma in brief. **3**

OR

12. a) Explain various approaches to quality improvement. **5**

b) What is Vendor quality rating an what basis is a Vendor rated. **5**

c) Write a short note on ISO 9000. **3**

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