Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering Semester –VI Examination Dec. - 2011

Subject code: 361903 **Date: 07/12/2011**
Subject Name: Industrial Engineering
Time: 02.30 pm – 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **English version is considered Authentic.**

Q.1 **(a)** Answer the Following

(I) Define Productivity and Explain in Brief Methods to Enhance it **04**

(II) State the five Objectives of Method Study **03**

(b) Answer the Following

(I) List and Draw Standard Symbols Used in Flow Process Chart **03**

(II) Define Therbligs and List and Draw At least Six Therbligs **04**

Q.2 **(a)** Answer the Following

(I) Define Quality and Statistical Quality Control (SQC) **03**

(II) Draw Histogram, Frequency Bar Chart, Frequency Polygon and Frequency Distribution Curve From the Following Data **04**
75, 80, 63,65, 70,12, 18, 22, 24, 29, 31, 33, 34, 35, 38, 40, 52, 55, 57, 60, 41,45, 47, 49,

OR

(II) 100 Student Appeared in M.E (Mechanical) Examination Conducted in January 2011 by the Gujarat Technological University. Average Percentage of Marks of the Student in Said Examination is 64.6 % and Standard Deviation of Mark is 4.6 % ,. Find out the Number of Student Who Secured Percentage of Mark Between 60 and 69.20 %. Consider the Area Under the Normal Distribution Curve for Z Value as : **04**
Z = - 1 Area is – 0.3413 and
Z = + 1 Area is + 0.3413

(b) Answer the Following

(I) Define Plant Lay- Out **02**

(II) Draw the Man Type Flow Process Chart From the Following Data **05**
Job : Writing a Typed Letter Using a Short Hand Typist
Chart Begins : Short Hand Typist in His Office Awaiting for Dictation
Chart Ends : Short Hand Typist Put Typed Letter and its Copies in Dispatch Tray
Distance Between Short Hand Typist's Office and Manager's Office is 10 Meter.
Assume Remaining Data for Each Activity Involved

OR

Q.2 **(b)** Answer the Following

(I) Classify the Material Handling Equipment **03**

(b) **(II)** A Stop Watch Time Study Was Conducted for Machining Shaft On a Lathe M/C and Following Data Were collected. **04**

Loading Time - 1.80 Minute
Machining Time - 6.75 Minute
Un Loading Time - 1.05 Minute
Inspection Time - 0.40 Minute
Over all Cycle Rating - 92 %
Allowance for Fatigue Etc - 12 %

Find Out the Standard Time for Machining Work and Calculate That How Many Shaft Will be Manufactured in 8 Hour Shift

Q.3 **(a)** Answer the Following

(I) Define " Work –Measurement " and "Job Evaluation " **04**

(II) Worker in a Workshop is Paid Wages According to Taylor's Differential Piece Rate Method. Standard Production Rate is 15 Units Per shift and its Wage Rate is Rs. 4. Per Unit, While Higher Wage Rate is Rs.5 Per Unit for Higher Production Than Standard Production. If Bonus is Paid at Rate of 30 % of Standard Production Wages, Find the Wage of Worker When He Produces 20 Units Per Shift .

(b) Answer the Following

(I) Explain in Brief Variation Pattern "Shift " and " Trend " Observed On Variable Control Chart **03**

(II) Following Data is Observed in a Production Run of The Shaft After Analysis of Various Samples of Sub- Group size of 4 . **04**

Mean of Sample's Mean of The Shaft Diameter --- $\bar{\bar{X}}$ = 20.01 mm
Mean of Sample's Range Of The Shaft Diameter ---$\bar{R}$ = 0.6 mm
For Sample Sub- Group Size -- 4 Consider Following Statistical Values
$A_2 = 0.729$, $D_3 = 0$, $D_4 = 2.282$ and $d_2 = 2.059$
Calculate The Control Limits for $\bar{\bar{X}}$ - $\bar{R}$ Charts As Well As Find Process Capability Of The Process

OR

Q.3 **(a)** Answer the Following

(I) Define " Rating " **02**

(II) Standard Time For given Work is 30 Hours. While Worker Completes This Work in 25 Hours. Wage Rate To Be Paid to the Worker is Rs.4 Per Hour . Find **05**

(i) Wage tobe Paid to the Worker Under 50- 50 Halsy Plan and Rovan Plan Each

(i i) Which Plan Is Better For The Worker

(b) **(I)** Explain in Brief " Process Capability " **03**

(II) In a Production of Bearings 10 Samples Each Of Sample Size of 100 Were Taken and Inspected. After Inspection Following Defectives Were Observed In Each Sample **04**

Sample No	1	2	3	4	5	6	7	8	9	10
Defective Bearings In a Sample	12	4	8	3	7	6	0	8	5	9

Q.4 (a) Answer the Following

(I) State The Difference Between Variable And Attribute Control Chart **04**

(II) State The advantages Of " Re- Engineering " **03**

Q.4 (b) Answer the Following

(I) Explain Importance Of Six – Sigma Concept **04**

(II) State Application Of ISO – 9000 **03**

OR

Q.4 (a) Answer the Following

(I) During The Production Of NENO Car 10 Car Were Inspected and defects In Each Car Were As Under **04**

NENO Car No	1	2	3	4	5	6	7	8	9	10
Defects In a NENO Car	1	3	13	4	2	5	3	3	4	5

Draw C- Chart , Control Limits And Comments About The Process

(II) State Application Of " Kaizen" Concept **03**

(b) Answer the Following

(I) Explain Importance Of " TQM " Concept **04**

(II) State Application Of " TQC " Concept **03**

Q.5 (a) Answer the Following

(I) Explain In Brief Principle Of "Statistical Tolerencing " **04**

(II) State Factors Affecting " Reliability " **03**

(b) Answer the Following

(I) Explain In Brief " Producer – Risk " And " Consumer – Risk With Reference To "Acceptance Sampling " **04**

(II) State Environmental Requirement Of Work- Place **03**

OR

Q.5 (a) Answer the Following

(I) An Assembly Is Made Of 4 Parts A,B,C And D Having Equal Tolerance . If An Assembly Tolerance Is + 0.06 And – 0.06 mm , Then Calculate Individual Part Tolerance. **04**

(II) State Factors Improving ' Reliability " **03**

(b) Answer the Following

(I) Following Data Is Related To Double Sampling Plan Used For Inspection Of 2400 Gudgeon Pin Lot. Take AQL As 4.0 % **04**

Sample	Sample Size (n)	Acceptance No (a)	Rejection No (r)
First	80	5	9
Second	80	12	13

Draw The Plan And Explain How It Is Operated

(II) Explain In Brief Psycho -- Physiological Data With Respect To Ergonomics **03**

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