

**GUJARAT TECHNOLOGICAL UNIVERSITY****DIPLOMA ENGINEERING - SEMESTER-VIII • EXAMINATION – SUMMER 2013****Subject Code: 361903****Date: 09/05/2013****Subject Name: INDUSTRIAL ENGINEERING****Time: 02:30 am TO 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 to be Authentic.

- Q.1** (a) (1) Define Productivity and Explain in Brief Methods to Enhance it **04**  
 (2) State the five Objectives of Method Study **03**  
 (b) State Various steps to carry out method study and explain each one briefly **07**

- Q.2** (a) (1) Define Therbligs and List and Draw At least Six Therbligs. **04**  
 (2) Define Plant Lay- Out **03**  
 (b) A Stop Watch Time Study Was Conducted for Machining Shaft **07**  
 On a Lathe M/C and Following Data Were collected.  
 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 - 90 %  
 Allowance for Fatigue Etc - 10 %  
 Find Out the Standard Time for Machining Work and Calculate That  
 How Many Shaft Will be Manufactured in 8 Hour Shift.

**OR**

- (b) List the types of wage plan and explain Taylor's Differential piece rate system. **07**
- Q.3** (a) (1) List at least six objectives of job evaluation **03**  
 (2) Draw the neat sketch of normal distribution curve, state percentage area covered under various specification limit. **04**  
 (b) During The Production Of NENO Car 10 Car Were Inspected and defects In Each Car Were As Under **07**

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

| NENO Car No             | 1 | 2 | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-------------------------|---|---|----|---|---|---|---|---|---|----|
| Defective in a NENO Car | 1 | 3 | 13 | 4 | 2 | 5 | 3 | 3 | 4 | 5  |

**OR**

- Q.3** (a) Explain X –R chart in detail. **07**  
 (b) From the given data in the table, find out mean and standard deviation **07**

| Class     | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 |
|-----------|-----|-----|-------|-------|-------|-------|-------|
| Frequency | 5   | 10  | 15    | 20    | 14    | 11    | 6     |

- Q.4** (a) (1) Explain In Brief Principle Of “Statistical Tolerancing “ **03**  
 (2) An assembly having tolerance 0.09mm is made of three parts of equal tolerances. Find the tolerances of individual part. **04**  
 (b) Following Data Is Related To Double Sampling Plan Used For **07**

Inspection Of 2400 Gudgeon Pin Lot. Take AQL As 4.0 %  
Draw The Plan And Explain How It Is Operated

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

OR

- Q. 4** (a) State The Difference Between Variable And Attribute Control Chart **07**  
(b) Define the following terms. **07**

(1) Production (2) Productivity (3) Work study  
(4) Work measurement (5) Quality

- Q.5** (a) (1) State Factors Improving 'Reliability' **03**

(2) Define the term Ergonomics and state the objectives of it. **04**

- (b) Explain the followings. **07**

(i) Kaizen (ii) Six sigma concept

OR

- Q.5** (a) (1) Classify the Material Handling Equipment. **04**

(2) Explain briefly normal working area and maximum working area **03**

- (b) Differentiate between reliability and quality control. **07**

\*\*\*\*\*

**pin-Ē** ŪāY ŪĒY ]Tpadktani VyaŪya AapaeAnetev2arvanl rltae3kma sm=vae **ĒĪ**  
ŪĒY m4D S3Dlna pae hēAael qae **ĒĒ**

**pin-Ē** ŪāY ŪĒY 4BI lē sm=vl il S3 AapaeAneAaama>AaŌa 0 4BI lē daae **ĒY**  
ŪĒY Pl aN3 l eAa]3 sm=vae **ĒĪ**

ŪbY l 4 mxln xapnl Adr xaf3 bnayva ma3eS3ap vaR 3a[m S3Dlnu3eal n **ĒĪ**  
krvama>Aavta>nlcmjnbna smynuAvl aken krvama>AaVya

l aŌlg ma3easmy – Ē.ŌĒ mlnl3  
mxlnlg ma3easmy – Ī.ĪĪ mlnl3

Anl aŌlg ma3easmy – Ē.ĒĪ mlnl3

[NlSpkxn ma3easmy – Ē.ĪĒ mlnl3

smg/saykl nuraŌlg – ŪĒ %

f3lk ma3eŌBŌa3 - ĒĒ %

Ak xaf3na 3nlē ma3eapnāi` t smy xa2ae Aa# kl aknl ix3f3ma>kŌl a>

ngnū]Tpadn 4vū=ĒAetep` xa2l ka!ae

A4va

**pin-Ē** ŪbY vje Pl anna>pkrael qaeAne3Ēl sRlfrllxlyl pls rē slS3m sm=vae **ĒĪ**  
ŪāY ŪĒY kayRnLyakenna>Ō hēAael qae **ĒĒ**

ŪĒY nāmR iDSSlByan kvRlael j d l j d l lml3 ma3etel nlcea>9ef5ael qae **ĒĪ**

ŪbY nēakarna>]Tpadn drllyan ds karna[NlSpkxn krvama>Aavta>nlcmjbnl **ĒĪ**

qamlAaen5l, tēa>pr4l sl-ca3RklŌaē il ml3 dxaRl, pae3 ixvexamŌ3

krae

| NENO Car No             | 1 | 2 | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-------------------------|---|---|----|---|---|---|---|---|---|----|
| Defective in a NENO Car | 1 | 3 | 13 | 4 | 2 | 5 | 3 | 3 | 4 | 5  |

A4va

**pin-Ē** ŪāY cl nāmk gūvtana ( x – R chart ) Aal q daevanl rlt sm=vae **ĒĪ**

ŪbY nlcea 3Ōl ma>Aapēl ivgtapra4l mln AneS3alNŌR DēvAænnl g` trl krae **ĒĪ**

| Class | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 |
|-------|-----|-----|-------|-------|-------|-------|-------|
|-------|-----|-----|-------|-------|-------|-------|-------|

|                   |     |  |                 |                       |                   |    |                  |    |   |    |  |
|-------------------|-----|--|-----------------|-----------------------|-------------------|----|------------------|----|---|----|--|
|                   |     | Frequency  | 5               | 10                    | 15                | 20 | 14               | 11 | 6 |    |  |
| p <sub>h</sub> -1 | ÜAÝ | ÜËÝ S3@S3Ikl 3aerllslg naeis@2at sm=vae                            |                 |                       |                   |    |                  |    |   | ËË |  |
|                   |     | ÜËÝ t7 wag wga krlnebnave =Ba`nupir`aïmk 3aerlls È.Ëi mlml m5tð    |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   |     | hag Anet7 ewagnevtt/3aerlls Aesrqhag taedrk wagnevtt/3aerlls xa2ae |                 |                       |                   |    |                  |    |   |    |  |
| ÜbÝ               |     | SvlkaR gùvtanl spa3l (AQL) 1 % =5vlnèËËÈÈ gj n plnna bneaj \$4a    |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   |     | ma3edbl slp lq Pl an dæl btavaeAnek[ rltoAprè 4xetesm=vae          |                 |                       |                   |    |                  |    |   |    |  |
|                   |     | Sample   | Sample Size (n) |                       | Acceptance No (a) |    | Rejection No (r) |    |   |    |  |
|                   |     | First  | 80              |                       | 5                 |    | 9                |    |   |    |  |
|                   |     | Second   | 80              |                       | 12                |    | 13               |    |   |    |  |
|                   |     | A4va   |                 |                       |                   |    |                  |    |   |    |  |
| p <sub>h</sub> -1 | ÜAÝ | cl naïmk Anegüaïmk Aal enaetfavt l qae                             |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   | ÜbÝ | nlcæapdaesm=vae  |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   |     | ÜËÝ JTpahn   |                 | ÜËÝ JTpakta           |                   |    | ÜËÝ vk83DI       |    |   |    |  |
|                   |     | ÜËÝ vkRmrmk3   |                 | ÜËÝ kvaRI3I           |                   |    |                  |    |   |    |  |
| p <sub>h</sub> -1 | ÜAÝ | ÜËÝ wraçapat7a v2arva ma3æapirb5aej `avae                          |                 |                       |                   |    |                  |    |   | ËË |  |
|                   |     | ÜËÝ Agabæmksnl Vya0ya Aapl tea heAaej `avae                        |                 |                       |                   |    |                  |    |   | Ëi |  |
| ÜbÝ               |     | nlcæapdaesm=vae  |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   |     | ÜËÝ kèzn   |                 | ÜËÝ slks slGma klls83 |                   |    |                  |    |   |    |  |
|                   |     | A4va   |                 |                       |                   |    |                  |    |   |    |  |
| p <sub>h</sub> -1 | ÜAÝ | ÜËÝ m3lrlyl h8DI lg sa2naæuvglr`krae                               |                 |                       |                   |    |                  |    |   | Ëi |  |
|                   |     | ÜËÝ inyimt Anemhïtm vki8 Aelya sm=vae                              |                 |                       |                   |    |                  |    |   | ËË |  |
| ÜbÝ               |     | wraçapat7a Anegüvïta inyit7 sm=vae                                 |                 |                       |                   |    |                  |    |   | Ëi |  |

\*\*\*\*\*