

Total No. of Questions :6]

SEAT No. :

P120

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APR. -16/BE/Insem. - 17**B.E. (Mechanical)****MECHANICAL SYSTEM DESIGN
(2012 Pattern) (Semester - II) (402048)***Time : 1 Hour]**[Max. Marks :30**Instructions to the candidates:*

- 1) *Answer Q 1 or Q2, Q3 or Q4, Q5 or Q6*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

- Q1)** a) Explain the significance of geometric progression ratio. **[4]**
- b) Compare different laws of regulation of speeds in multispeed gear box. **[6]**

OR

- Q2)** A six speed gear box is to be designed for a machine tool drive. The spindle speeds range between 200 rpm And 1200 rpm. If the gear box is driven by motor of 8 KW, 1200 rpm through belt drive. Draw the speed diagram and gearing diagram. **[10]**

- Q3)** a) Give the comparison between Normal distribution and Standard Normal distribution curves. **[4]**
- b) The diameters of a bolt are normally distributed with a mean of 10.02 mm and a standard deviation of 0.01 mm. The design specifications for the diameter are 10 ± 0.025 mm. Calculate the percentage of bolts likely to be rejected. (The area below normal curve from $Z = 0$ to $Z = 0.5$ is 0.1915). **[6]**

OR

P.T.O.

Q4) A mechanical component is subjected to a mean stress of 207 Mpa with a standard deviation of 55.2 Mpa. The material has a mean strength of 276 MPa with a standard deviation of 41.4 MPa. **[10]**

- Find the probability of failure.
- If the material is changed such that its mean strength is 380 MPa find the probability of failure. Area from 0 to Z is as

Z	1.0	2.5	3.0
Area	0.3413	0.4938	0.4987

- Q5)** a) Explain the guidelines involved for selection of material handling equipment. **[4]**
- b) Explain the steps involved in belt conveyor analysis. **[6]**

OR

Q6) A triple ply belt conveyor is required to transport 4 tons of iron ore per hour at a conveyor speed of 3 m/sec. If the mass density of iron ore is 2.5 tons/m³. Suggest : **[10]**

- The maximum suitable inclination for the conveyor
- The diameter of the drive pulley
- The gear box reduction ratio, if motor speed is 1440 rpm. Use following data:

Belt inclination α	16 - 20°	21 - 25°	26 - 30°	31 - 35°
Flowability 'K' factor	2.2* 10 ⁻⁴	2.35* 10 ⁻⁴	2.20* 10 ⁻⁴	---

