B.E.(with Credits)-Regular-Semester 2012-Mining Engineering Sem III

# MN305 - Mechanical Engineering

P. Pages : 3 **GUG/W/16/3801**

Time : Three Hours * 3 6 3 6 * Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Answer all questions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer wherever necessary with the help of neat sketches.

**1.** a) Explain the following terms related to belt drives. **9**

i) Slip and creep in belt drive
ii) Centrifugal tension in belt
iii) Initial tension in belt
Explain its effect on power transmission in belt drive.

b) Give the relative advantages and limitations of flat and V – belt drives. **7**

**OR**

**2.** a) Explain the following spur Gear Terminology with neat sketch. **8**

| | | | |
|---|---|---|---|
| i) | Dedendum circle | ii) | clearance circle |
| iii) | pitch circle | iv) | addendum circle |
| v) | face width | vi) | tooth thickness |
| vi) | tooth height | viii) | face |
| ix) | top land | x) | Bottom land |
| xi) | Addendum | xii) | Dedendum |

b) State the pair of Gear drive, you will prefer under following conditions. **8**

i) If two shafts are parallel and co – planar and having no axial thrust.

ii) If two shafts are inclined and co – planar

iii) If two shafts are perpendicular but not co – planar

iv) If two shaft are parallel, coplanar but subjected to axial thrust.

**3.** a) Explain the working of 'Single plate clutch' with neat sketch. Why it is called friction clutch? **8**

b) State types of sliding contact Bearings. Explain advantages and limitations of Hydrodynamic bearings. **8**

**OR**

**4.** a) Explain the methods of lubrication of rolling contact bearings. **8**

b) Explain the working of positive clutch with neat sketch. **8**

**5.** a) State first low of thermodynamics as applied to closed system (nonflow system). **3**

b) Explain various nonflow processes. **3**

c) Show the Iso – basic process (Le. heating of gas at constant pressure) on P-V and T-S diagram. **3**

d) Derive the expression for work done (W) during Isentropic expansion of gas in terms of mass (m), Gas constant (R) and temp. difference ($T_2 – T_1$) and ratio of specific heat (r). Draw also P-V and T -S diagram for Isentropic expansion. **7**

**OR**

**6.** a) Derive the expression for thermal efficiency of Otto cycle in terms of compression Ratio ($R_c$). **8**

b) In an engine working on Otto – cycle, the temperature at the beginning and at the end of compression stroke are 27° C and 327° C. Find the compression Ratio and thermal efficiency of the engine. **8**

**7.** a) Give the comparison between Petrol engine and Diesel Engine on the basis of following factors. **8**

| | | | |
|---|---|---|---|
| i) | Component used | ii) | Cycle of operation |
| ii) | Fuel induction | iv) | Ignition of charge |
| v) | Compression Ratio | vi) | Efficiency |
| vii) | Pollution induced | viii) | Weight and cost |

b) Explain with neat sketches, working of 2-stroke petrol engine. **8**

**OR**

**8.** a) What is "Carburation"? What are the various factors affecting carburation? **5**

b) With neat sketch, explain the various parts of simple carburetor and its working. **5**

c) On the basis of following aspects, Differentiate between Battery ignition system and Magneto ignition system. **6**

| | | | |
|---|---|---|---|
| i) | Source of energy | ii) | Primary current obtained |
| iii) | Starting | iv) | Space required |
| v) | Maintenance | vi) | applications |

**9.** a) Explain the construction and working of single acting, single stage reciprocating air compressor, with neat sketch. **6**

b) State the classification of Rotary compressors. **5**

c) Give the comparison between Reciprocating and Rotary compressor on the basis of following points. **5**

i) Pressure ratio obtained

ii) Volume of air handled

iii) Speed of compressor

iv) Maintenance

v) Mechanical efficiency

**OR**

**10.** a) State the classification of Air – conditioning system. **6**

b) Explain 'Summer – Air conditioning system' with neat sketch. **10**

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