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Total Number of Pages: 02

**M.TECH**  
**MDPC 201**

**2<sup>nd</sup> Sem Mtech Regular/ Back Examination – 2015-16**  
**BASIC MECHANICAL HANDLING SYSTEMS**  
**Mechanical system design**

**Time: 3 Hours**

**Max marks: 70**

**Q.CODE:W774**

**Answer Question No.1 which is compulsory and any five from the rest.**  
**The figures in the right hand margin indicate marks.**

Answer the following questions

[2x10]

1.
  - a) What is the variation in % of speed of chain due to polygonal effect if the sprocket has eleven teeth?
  - b) What is meant by 6x37 wire rope ?
  - c) How will the stress in the ropedue to lifting load be modified in case the diameter of the drum is small?
  - d) What are multiple Pulley systems? What are the advantages over single Pulley system?
  - e) Which one of spur, helical and worm gears is the most compact for same speed reduction
  - f) What is the use of Ramshorn Hook ? What are advantages of using this type of hook over other type of hooks ?
  - g) What do you mean by a formative spur gear?
  - h) Which surface of a crane hook is subjected to maximum stress?
  - i) What is the use of ratchet Gearing system?
  - j) What is rail travelling Mechanisms?
  
2.
  - (a) What are the principal factors affecting to choose the material handling equipments ? [5]
  - (b) Give a brief description of various general characteristics of hoisting machines. [5]

- It is required to select a 6x7 wire rope with 1500 as tensile designation for a hoist on the basis of fatigue considerations. The weight of the hoist along with the material is 3.5 kN, which is to be raised from a depth of 120 m. The maximum speed of 4.5 m/s is attained in 5 seconds. Determine the size of the wire rope and sheave diameter for long life on the basis of the fatigue as failure criterion. What is the factor of safety of this wire rope under static conditions. [10]
- 3.
4. Design a crane hook assembly for a capacity of 25 kN. Choose trapezoidal cross-section with bed diameter equal to 65 mm. [10]
5. Two Pulleys, one 450 mm diameter and the other 200 mm diameter, on parallel shafts 1.95 m apart are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. [10]
- What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25
6. Determine the required power rating of the motors of an electric overhead travelling crane for the assembly shop of an engineering plant. [10]
- Given : Lifting capacity,  $Q=5,000$  kN, Span,  $L_{cr}=14$  m. Load lifting ( or lowering) speed,  $v_{load}=10$  m/min, trolley traverse speed,  $v_{trol}=45$  m per min, crane travelling speed  $v_{cr}=100$  m/min, power supply-three- phase, 380 v, duty-medium (DF=25 per cent)
7. Design a chain drive to actuate a compressor from 15 kW electric motor running at 1050 r.p.m., the compressor speed being 300 r.p.m. The minimum centre distance 450 mm. the compressor operates 16 hours per day. The chain tension may be adjusted by shifting the motor on slides. [10]
8. Answer the following : [2 x5]
- (a) Write down the design procedure of wire rope hoisting machines?
- (b) What is Gantry cranes ? What are the difference over simple crane system ?
- (c) What is Shackles and where is it used?
- (d) What is Grab Buckets?
- (e) Write brief notes on Electric Hoists ?