B.E. (Mechanical) (Sem-VIII) (CBCGS) Mech
Design of Mechanical Systems 90769

University of Mumbai

Examinations Summer 2022

Time: 3hourMax. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	..... motor power is required for centrifugal pump if, specific weight of water is 9810 N/m^3, discharge is 1049.4 LPM, manometric head is 47.65 m and overall efficiency is 85%.
Option A:	9.61 KW
Option B:	12.60 KW
Option C:	15 KW
Option D:	20 KW
2.	If a flat belt is passing over the drum having drum diameter 750 mm with a speed of 1.56 m/sec, then the drum shaft will rotate with .....
Option A:	32.27 rpm
Option B:	36.72 rpm
Option C:	39.72 rpm
Option D:	45.72 rpm
3.	A machine tool gear box has minimum speed of 100 rpm. If thegeometric progression ratio is 1.06, then the number of speed steps required to achieve 200 rpm will be .....
Option A:	10
Option B:	11
Option C:	13
Option D:	14
4.	Whipping stress in connecting rod is due to.....
Option A:	Vibrations of crankshaft
Option B:	Reciprocating motion of piston
Option C:	Inertia force on connecting rod
Option D:	Obliquity of connecting rod
5.	The step of preparing a blue print of the design is a part of .....
Option A:	Structural design
Option B:	Design of methodology
Option C:	Design of optimization
Option D:	Design of morphology
6.	If the net positive suction head (*NPSH*) requirement for the pump is not satisfied, then.....
Option A:	No flow will take place
Option B:	Cavitation will be occurred
Option C:	Efficiency will be lowered
Option D:	Excessive power will be consumed
7.	If the equivalent load acting on a roller bearing to be used for the hoisting drum is 29160 N and the life required is 5.064 million of revolutions, then thedynamic load carrying capacity of the bearing will be .....

Option A:	4743.90 Kgf
Option B:	4347.09 Kgf
Option C:	3447.90 Kgf
Option D:	7434.90 Kgf.
8.	In the harmonic progression …….
Option A:	The difference between reciprocal of two successive spindle speeds is constant
Option B:	The difference between two successive spindle speeds is constant
Option C:	The ratio of two successive spindle speeds is constant.
Option D:	The ratio of two successive spindle speeds is variable.
9.	Steel rope life is approximately ----------the number of bends
Option A:	Directly proportional to
Option B:	Inversely proportional to
Option C:	Equal to
Option D:	Five times more than
10.	If the number of rope falls are 4 and the hoisting speed is 8m/min,then the rope velocity will be -------
Option A:	32 m/min
Option B:	16 m/min
Option C:	8 m/min
Option D:	4 m/min

Q2.	**Solve any Two Questions out of Three** **10 marks each**
A	Following specification refers to an EOT crane Load to be lifted =7 tonne , Maximum lift = 8m Hoisting Speed = 7m/min., Application = Class II Span = 8m, Velocity of cross travel = 20 m/min. 1) Select suitable type and size of wire rope for an expected life of 12 months. 2) Design pulley axle.
B	A 20°C troughing belt conveyor system has the following specification: Material conveyed: Coal, Capacity: 300 TPH, Centre distance = 50m. 1)Determine the width of belt. 2) Select suitable motor for the conveyor.
C	A four stroke single cylinder water cooled diesel engine develops 7.5KW brake power when operating at 1000rpm 1)Design size of engine with liner. 2) Design the piston.

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	A gear pump is to be designed to deliver 120 LPM of SAE 30 oil at a pressure of 70 bar. 1) Design gear and check it for bending failure. 2) Select suitable motor for gear pump.
B	A centrifugal pump directly coupled to a motor is required to deliver 1000 LPM of water at 30^0C against a total head of 25m.

	1) Select suitable motor with power and speed. 2) Determine impeller diameter, inlet and outlet vane angles and no. of vanes.
C	A 2x3x2 type,twelve speed gear box is to be designed for a machine tool where a spindle speeds varying between 50rpm and 3000rpm. If the gear box is driven by 7.5 KW, 1440rpm electric motor.Assume same module for all gears. 1) Draw optimum structural diagram 2) Draw ray diagram and speed chart. 3) Determine the number of teeth on the gears of the second stage.

Q4.	**Solve any Four out of six 5 marks each**
A	Draw flow chart for the morphology of design and explain each phase.
B	Explain the basic constructional details of different types ropes used in EOT crane. What do you understand by 6 × 37 rope?
C	Why cleaning of belt is necessary for belt conveyor? List down the usual types of cleaners.
D	List different types of piston rings and their function.
E	What are advantages of multi-fall system in hoisting mechanism?
F	Illustrate the significance of NPSH in centrifugal pump.

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Correction in 53351 - Design of Mechanical Systems

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Correction required **1T01428** - B.E (Mechanical Engineering) (SEM-VIII)(Choice Base Credit Grading System) / **53351** - Design of Mechanical Systems
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Correction required.

Question 2B:

Assume suitable angle of inclination of belt conveyor from zero degree to 18 degree.

University paper correction

Correction in 1T01428 - B.E (Mechanical Engineering) (SEM-VIII)(Choice Base Credit Grading System) / 53351 - Design of Mechanical Systems

Q.P.Code: **90769**

Question 2B:

A 20°C troughing belt conveyor system has the following specification:

Read the sentence as "A 20° troughing horizontal belt conveyor system has the following specification"

Inclination of belt = Zero degree

Lump size is not required.