Q. Code:115956

Reg. No. | | | | | | | | | | | | | |

B.E. / B. TECH.DEGREE EXAMINATIONS, MAY 2024

Sixth Semester

ME18602 – DESIGN OF TRANSMISSION SYSTEMS

(Mechanical Engineering)

*(*Use of Approved Data book is permitted; Assume suitable data if needed*)*

(Regulation 2018A)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	The students will apply procedures to design the belt and chain drives.	**4**
CO 2	The students will apply the design procedure for spur and helical gear drives using the manufacturer's catalogue.	**4**
CO 3	The students will analyze the bevel and worm gear drive design by adopting the manufacturer's catalogue.	**4**
CO 4	The students will design the gear box by adopting the design procedures.	**4**
CO 5	The students will design the clutches and brakes using the laws of friction.	**4**

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Why tight side of the Flat belt should be at the bottom side of the pulley?	**1**	**3**
2.	What is to be done to accommodate initial sag in chain drives?	**1**	**2**
3.	Mention the specific advantages of helical gear over spur gear towards real time applications point of view.	**2**	**2**
4.	Why is dedendum value more than addendum value?	**2**	**2**
5.	Differentiate a straight bevel gear and a spiral bevel gear.	**3**	**2**
6.	In a worm gear drive system, Why multi start worm more efficient than the single start worm?	**3**	**2**
7.	Which type of gear is used in constant mesh gearbox? Justify.	**4**	**2**
8.	What does ray- diagram of gear box reveals to real time engineering practitioners.	**4**	**2**
9.	Why it is necessary to dissipate the heat generated during clutch operation?	**5**	**3**
10.	Why in automobiles braking action when travelling in reverse is not as effective as when moving forward?	**5**	**3**

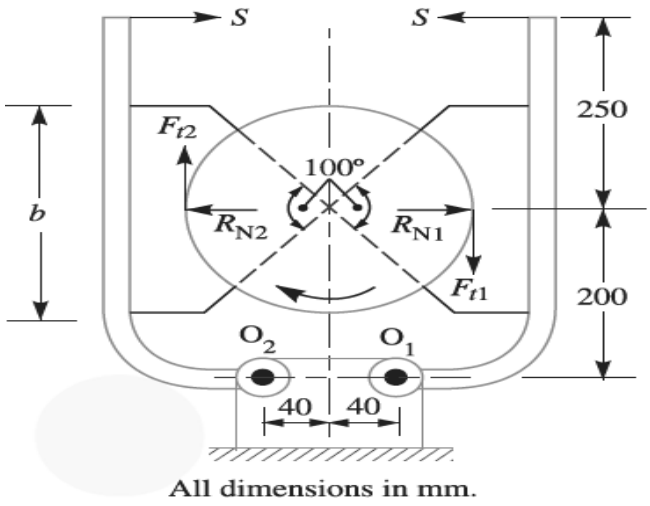
PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	A V-belt drive is to transmit 40KW in a heavy duty saw mill which works in two shifts of 8hours each. The speed of motor shaft is 1440 rpm with the approximate speed reduction of 3 in the machine shaft. Design the drive.	**(14)**	**1**	**3**

(OR)

(b)	Design a chain drive to actuate a compressor from a 8 kW electric motor at a speed of 1200 r.p.m and the compressor begin 300 r.p.m. Minimum centre distance should be 600 mm and the chain tension maybe adjusted by shifting the motor on rails. The compressor is to work 8 hour/day.	**(14)**	**1**	**3**
12. (a)	Design a pair of straight spur gear to drive the reciprocating pump, the gears are made of C45 steel. The pinion is to transmit 20 kW at 1500 rpm. The gear ratio is 3. The gear is to work 8 hours/day, 6days in a week for 3 years. The pressure angle of 20° have to be considered for gears.	**(14)**	**2**	**3**
	(OR)			
(b)	Design a pair of helical gears to transmit 20 kW at 1400 rpm of the pinion. The drive is subjected to moderate shock loading. The speed reduction ratio is 3 and the helix angle is 15°. Select a suitable material. Check for working stresses. Take life of gear is 10,000 hours.	**(14)**	**2**	**3**
13. (a)	Design a bevel gear drive, to transmit 10 KW power at 1440 rpm. Gear ratio is 3, and life of gears 10,000 hrs. Pinion and gear are made of C45 steel and consider minimum number of teeth as 20 numbers.	**(14)**	**3**	**3**
	(OR)			
(b)	Design a worm gear drive to transmit a power of 22.5 KW. The worm speed is 1440 rpm and the speed of the wheel is 60 rpm. The drive should have a minimum efficiency of 80% and or above. Select suitable materials for the worm and the wheel and decide upon the dimensions of the drive.	**(14)**	**3**	**3**
14. (a)	The spindle of a pillar drill is to run at 12 different speeds in the range of 100rpm and 355 rpm. Design a three stage gear box with a standard step ratio. The gear box receives 5KW from an electric motor running at 1400 rpm. Sketch the layout of the gear box, indicating the number of teeth on each gear. Also sketch the speed diagram.	**(14)**	**4**	**3**
	(OR)			
(b)	Design the headstock gear box of a lathe having nine spindle speeds ranging from 50 to 1500 rpm. The power of the machine may be taken as 6.5 kW and speed of the motor is 1450 rpm. a) Draw the speed diagram b) Sketch the layout of the gear box.	**(10)**	**4**	**3**

15. (a)	A multi disk clutch consists of five steel plates and four bronze plates. The inner and outer diameters of friction disks are 75mm and 150mm respectively. The coefficient of friction is 0.1 and the intensity of pressure is limited to 0.3. N/mm2. Assuming the uniform wear theory, calculate (i) The required operating force, and (ii) Power transmitting capacity at 750 rpm.	**(14)**	**5**	**3**
	(OR)			
(b)	A double shoe brake is capable of absorbing a torque of 1500 N-m. The diameter of the brake drum is 300 mm and the angle of contact for each shoe is 100°. If the coefficient of friction between the brake drum and lining is 0.4; find: 1. the spring force necessary to set the brake; and 2. the width of the brake shoes, if the bearing pressure on the lining material is not to exceed 0.3 N/mm^2	**(14)**	**5**	**3**



All dimensions in mm.

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A special purpose broaching machine has to be following levels of selections speeds starts from 125,160,200,250,315,400 rpm for the doing machining at different cutting conditions. The rated powers of 5kW at 710 rpm as input speeds are basic driving source requirements. Design a gear box to meet out the above stated specifications. Also list the machine elements involved in the gear box.	**(10)**	**1**	**5**

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