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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 2025

DESIGN OF MACHINE ELEMENTS

[Maximum marks: 75] [Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark.

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	When the kinematic pairs are coupled in such a way that the last link is joined to the first link to transmit definite motion is called……..	M1.02	R
2	Define factor to safety for ductile material.	M1.01	R
3	The included angle for Acme thread is……..	M1.05	R
4	Define torsional stiffness.	M2.01	R
5	The value of thickness of a square sunk key for a shaft diameter of 60 mm is…….	M2.03	U
6	The vertical distance from the centre of the fly ball to the point where the axes of the upper arms intersect on the spindle axis is called…….	M3.02	R
7	State co-efficient of fluctuation of speed.	M3.03	R
8	The angle of contact of the bearing with the journal is 360^0 then it is called……	M3.05	R
9	Define creep in belt drives.	M4.02	R

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

		Module outcome	Cognitive level
1	Explain leg of the fillet weld and throat thickness with neat sketch.	M1.04	U
2	List the different types of shafts in detail.	M2.01	R
3	Explain different types of keys with neat sketch.	M2.03	U
4	Explain the advantages of hollow shafts over solid shafts.	M2.02	U
5	Design the square key for shaft of 45 mm diameter. The shearing stress is limited to 80 MPa.	M2.03	U
6	Explain any two types of cams with neat sketch.	M3.01	U

7	List the different types of couplings.	M3.04	U
8	Explain Porter governor with neat sketch.	M3.03	R
9	Explain the functions of flywheel.	M3.06	R
10	Explain the advantages of rope drives.	M4.03	R

PART C

Answer all questions. Each question carries seven marks.

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Explain types of constrained motion with suitable examples.	M1.02	U
	OR		
IV	Explain different types of riveted joints with neat sketch.	M1.04	U
V	Explain the inversion of single slider crank chain with neat sketch.	M1.02	U
	OR		
VI	A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of double parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of the weld so that the maximum stress does not exceed 56 MPa. Draw the figure of the joint also.	M1.03	A
VII	A mild steel shaft transmitting power is subjected to a torque of 2860 Nm. If the angle of twist is one degree in a length of 1498 mm and the modulus of rigidity is 79 GPa. Calculate the diameter of the shaft.	M2.02	U
	OR		
VIII	Compare the weight and stiffness of a hollow shaft of the same external diameter as that of solid shaft. The inside diameter of the hollow shaft is being half of the external diameter. Both the shafts have the same material and length.	M2.02	A
IX	A cam with a minimum radius of 50 mm, rotating clockwise at a uniform speed to be designed to give a roller follower with the following motion: a) To raise the valve through 20 mm during 60^0 rotation of the cam.	M3.01	A

	b) To keep the valve fully raised through next 30^0. c) To lower the valve during next 60^0. d) To keep the valve closed during rest of the revolution. The diameter of the roller is 15 mm. The displacement of the valve while being raised and lowered, is to take place with simple harmonic motion. Draw the displacement diagram and the profile of the cam when the line of stroke of the valve rod passed through the axis of the cam shaft. **OR**		
X	Compare flywheel and governor.	M3.04	R
XI	One 300 mm diameter pulley is fixed on the prime mover shaft and the driven shaft has a pulley of 200 mm diameter. The distance between the centres of both pulleys is 5.3 m. Find the required length of the belt for an open belt drive. **OR**	M4.02	U
XII	A simple gear train consists of four gears A,B,C and D. The gear has 30 teeth meshes with B, B has 40 teeth meshes with C, C has 60 teeth meshes with D and D has 40 teeth. If the A makes 36 rpm, find the rpm of the gear C and D.	M4.04	U
XIII	A set of spur gear wheels are arranged as follows: Gear 'A' drives Gear 'B'. Gears 'B' and 'C' is a compound wheel. Gear 'C' drives Gear 'D'. If number of teeth on Gear A = 25, on B = 50, on C = 35 and on D = 70. If Gear A rotates at 300 RPM. Find the RPM of wheel D. **OR**	M4.04	U
XIV	A 300 mm diameter pulley running at 200 rpm is connected by belt to another pulley at a distance of 3 m. The second pulley has to rotate at 120 rpm. If the belt is 5 mm thick and slip between belt and the pulley is 3% at each stage, determine the diameter of second pulley. Also find the length of the belt if the drive is an open belt drive.	M4.02	A

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