

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER - 2024**

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	Write any two factors governing design.	M1.01	R
2	Define a kinematic link.	M1.02	U
3	List any two types of shafts.	M2.01	R
4	The key with semicircular disc shape is called	M2.03	R
5	Define trace point of a cam.	M3.01	R
6	Write any two applications of flywheel.	M3.03	R
7	Define the slip of a belt.	M4.02	R
8	What is meant by the flank of a gear?	M4.04	R
9	List any two advantages of rope drives.	M4.03	R

PART B

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

(8 x 3 = 24 Marks)

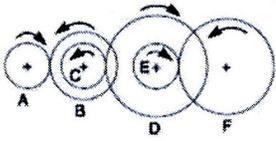
		Module outcome	Cognitive level
1	Explain completely constrained motion with sketch.	M1.02	U
2	Discuss about the standard sizes of shafts.	M2.01	U
3	Write down the equation for power transmitted by a solid shaft.	M2.02	R
4	Write the polar moment of inertia for solid and hollow shaft about the axis of rotation.	M2.02	U
5	Illustrate feather key.	M2.03	U
6	Classify cams.	M3.01	U
7	List out the types of governors.	M3.02	U
8	Discuss the classification of couplings.	M3.05	U
9	Explain collar bearings with sketch.	M3.06	U
10	Discuss about the different power drives.	M4.01	U

PART C

Answer all questions. Each question carries seven marks.

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Discuss about the sliding pair and rolling pair with sketches. OR	M1.02	U
IV	A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 KN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa.	M1.03	A
V	Explain the working of single slider crank mechanism. OR	M1.02	U
VI	Discuss about the double riveted lap joint and double riveted butt joint with double cover plate with sketches.	M1.04	U
VII	Design the rectangular key for a shaft of 50 mm diameter by considering shearing stress only. The width of the key is 16 mm and thickness is 10mm. The shearing stress for the key material is 42 MPa. OR	M2.03	A
VIII	A line shaft rotating at 200 rpm is to transmit 20 KW. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42 MPa. Determine the diameter of the shaft. Neglect the bending moment of shaft.	M2.02	A
IX	A cam is to be designed for a knife edge follower with the following data: Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion, dwell for the next 30° , during the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion, dwell during the remaining 180° . The radius of base circle of cam is 40 mm, draw the profile of cam if the line of stroke of the follower passes through the axis of cam shaft. OR	M3.01	A
X	Compare flywheel and governor.	M3.04	U

XI	Write short note on rope drives and list the types of ropes. OR	M4.01	U														
XII	An engine running at 150 rpm, drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft is 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when there is no slip.	M4.02	A														
XIII	List the advantages and disadvantages of chain drive over belt drive. OR	M4.03	U														
XIV	The gearing of a machine tool is shown below. The motor shaft is connected to gear A and rotates at 975 rpm. The gear wheels B, C, D and E are fixed to parallel shafts rotating together. The final gear F is fixed on the output shaft. What is the speed of gear F? The number of teeth on each gear are as given below.  <table border="1" data-bbox="451 1062 995 1178"> <thead> <tr> <th>Gear</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>No.of teeth</td> <td>20</td> <td>50</td> <td>25</td> <td>75</td> <td>26</td> <td>65</td> </tr> </tbody> </table>	Gear	A	B	C	D	E	F	No.of teeth	20	50	25	75	26	65	M4.04	A
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