

B. PRINTING ENGINEERING EXAMINATION, 2025

(2ND Year, 1ST Semester)

PRINTING MACHINE DESIGN

Time : 3 Hrs.

Full marks :100

(Attempt any one from (A) and (B) in Question-1.)(marks=10)

- 1A. Discuss the general design process. (10)
- 1B. Discuss the basic requirements for machine elements and machines. (10)

(Attempt any two from (A), (B) & (C) in Question-2.)(marks=20)

- 2A. (i) What are the various forms of screw threads? Give the sketches and write their design parameters. (6)
- (ii) Two machine parts are fastened together tightly by means of a **24mm** tap bolt. If the load tending to separate these parts is neglected, find the stress that is set up in the bolt by the **initial tightening**.
Given : Size of bolt **M24 X 3 mm**. Core dia. is **dc= ϕ 20.32 mm**. (4)
- 2B. (i) What are the **important terms** used in **screw threads**? Explain with **neat sketches**. (6)
- (ii) What is meant by a bolt of sizes **M24 X 2** and **M24X3** ? (2)
- (iii) What do you understand by **single start** and **double start threads**? (2)

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- 2C. (i) What is a key ? state its function. (4)
- (ii) How are the keys **classified** ? **Draw** neat sketches of different types of keys and **state their applications**. (6)

(Attempt any two from (A), (B),(C),(D) & (E) in Question-3.)(marks=20)

- 3A (i) **Discuss the function** of a coupling. Give at least two **practical applications**. (6)

- (ii) What are the **requirement** of a **good shaft coupling**? (4)

OR

- (iii) Sketch a **protective type flange coupling** and **indicate** there on its **leading dimensions** for shaft size of "d". (10)

- 3B (i) **Discuss the procedure** used in designing a cast iron pulley with a neat sketch. (10)

OR

Discuss the different types of pulleys used in flat belt drives.

- 3C. (i) How the shaft is designed when it is subjected to twisting moment only ? (4)
- (ii) Find the diameter of a solid shaft(steel) to transmit power **20 kW** At **200 rpm**. The ultimate shear stress for steel may be taken as **360 N/mm²** and a factor of safety as **8**.
If a hollow shaft is to be need in place of the solid shaft find the inside and outside diameter when the ratio of inside to outside diameter is **0.5**. (6)

3D. (i) Define the terms:

(a) load; (b) stress; (c) strain

and discuss the various types of stresses with neat sketches. (6)

(ii) What do you mean by factor of safety ? (4)

3E. (i) List the important factors that influence the magnitude factor of safety. (4)

(ii) A mild steel rod of $\phi 12\text{mm}$ was tested for tensile strength with gauge length of 50mm. Following observations was recorded:
Final length = 80mm; Final diameter = $\phi 7\text{mm}$; Yield load = 3.4kN. and Ultimate load = 6.1kN.

Calculate: 1. Yield stress(σ_y), 2. Ultimate tensile stress(σ_u),

3. % reduction in area, 4. % elongation. (6)

(Attempt any two from (A), (B), (C) & (D) in Question-4.)(marks=20)

4A. What condition must be satisfied in order that a pair of spur gears may have a constant velocity ratio (Law of gearing) ? (10)

4B. Explain the terms with neat sketch :

(a) Circular pitch (b) base circle
(c) pressure angle (d) module (10)

- 4C. What do you understand by 'gear train'? Discuss the various type of gear trains with neat sketches.
How the velocity ratio of this train is obtained. (10)

- 4D. The gearing of a machine tool is shown in **FIGURE -1**. The motor shaft is connected to gear A and rotates **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 :

Gear	:	A	B	C	D	E	F
Number of teeth	:	24	56	30	80	32	72

(10)

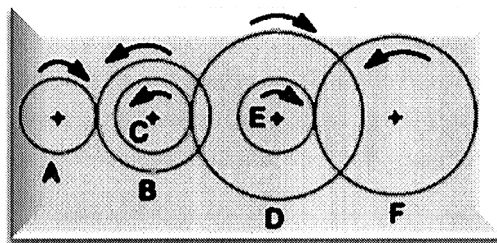


FIGURE - 1

(Attempt any two from (A), (B) & (C) in Question-5.)(marks=20)

- 5A. (i) What are the four main parts of a Ball Bearing?
Give the sketch. (4)
- (ii) In a particular application, the radial load acting on a ball bearing is **21 kN** and there is no thrust load. For a shaft that is **75 mm** in diameter and the expected life of the bearing is **10000 hr**. Calculate the **dynamic load carrying capacity** of the bearing, when the shaft rotates at **125 rpm**. (6)

5B. Sketch a sliding gear box and explain its working. (10)

5C. A pair of spur gears consists of a 20T pinion meshing with 120T gear. The module is 4 mm.

Calculate : (i) the centre distance,
(ii) P.C.D. of pinion and gear,
(iii) the addendum and dedendum,
(iv) tooth thickness,
(v) the bottom clearance,
(vi) the gear ratio. (10)

(Attempt anyone from (A) and (B) in Question-6.)(marks = 10)

6A. (i) Distinguish clearly, giving examples between spindle, axle and shaft. (4)

(ii) Indicate what type of coupling is used under the following conditions:
(A) with shafts having collinear axes,
(B) shafts having parallel axis with a small distance apart.
(C) shaft having intersecting axis. (6)

6B. Name the various rollers used in inking system of a OFF-SET printing machines and mention their dimensions, types of covering use. (10)