PRACTICE QUESTIONS. 1 — 3

1. For the four-bar chain of fig. below, find the velocity of point C, and the angular velocity of link PB for the position shown.
AC = CB = 0.45 m, OA = 0.15 m, PB = 0.
and crank OA rotates clockwise with a angular velocity of 2.6 rad/s.

Scales: Space diagram — 1 cm ≡ 20 cm
Velocity diagram — 1 cm ≡ 0.2 m/

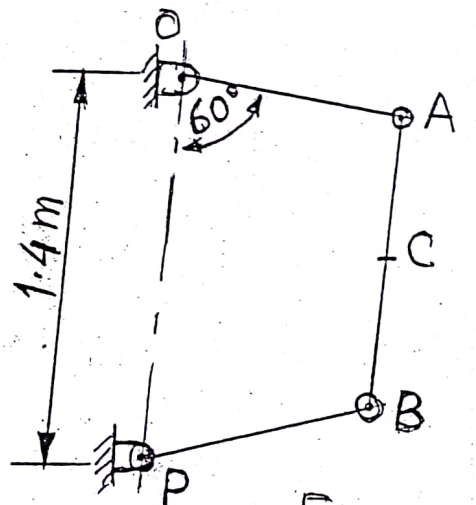


Fig.

2. Fig. below shows a kinematic scheme of a Geneva mechanism whereby constant rotation of shaft O gives intermittent rotation of shaft P. A is the slider on the end of the crank centre O, and B is a fixed point on the link centre P. If the distance between shaft centres is 100 mm and crank OA is 35 mm and rotates at 120 rev/min in the

direction shown, find the angular velocity of the link PB at the position shown.

Scales: Space diagram — FULL SIZE
Velocity diagram — 1 cm ≡ 0.1 m/s

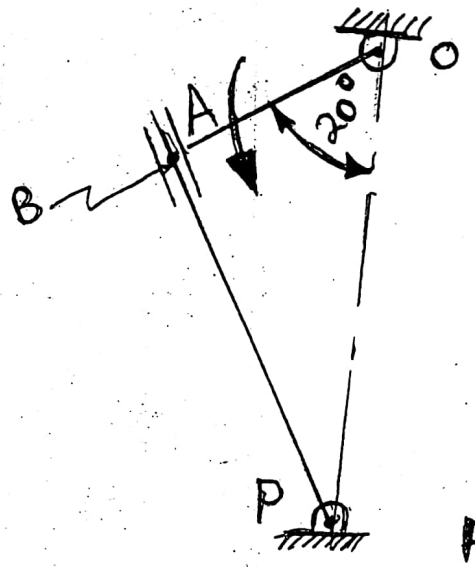


Fig.

3. In the slider-crank-mechanism shown in fig. below, the crank AB is 50 mm long and rotates about A at a constant speed of 180 rpm. The connecting rod BC is 250 mm long and point G is 100 mm from B. For the position shown, determine the velocity of the slider at C (i.e. $V_{C/A}$) and of point G (i.e. $V_{G/A}$).

Scales: Space diagram — HALF SIZE
Velocity diagram — 1 cm ≡ 0.2 m/s

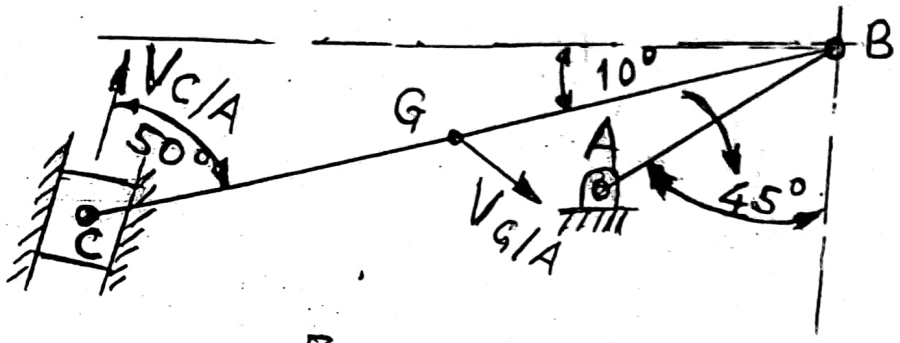
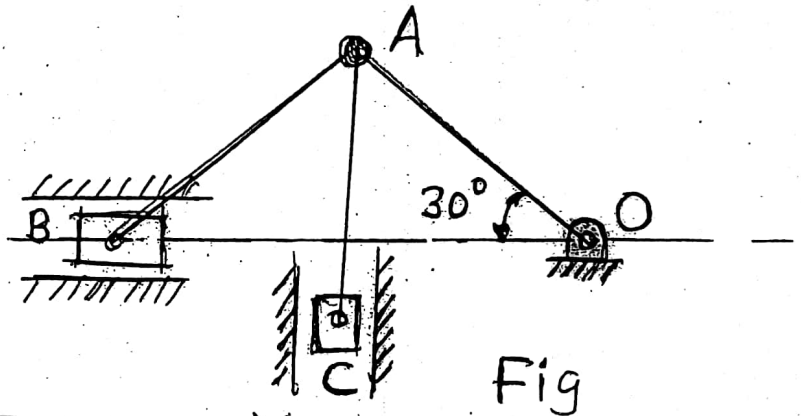


Fig.

4. In the mechanism shown in fig. below, Crank OA rotates at 100 rev/min clockwise. Link AB and AC are pin-jointed at A and the pin ends B and C are attached to blocks sliding in horizontal and vertical guides respectively. For the position shown when C is vertically below A, find the velocity of B and C and the angular velocity of links AB and AC. OA = AB = AC = 150 mm.

Scales: Space diagram — HALF SIZE
Velocity diagram — 1 cm ≡ 0.2 m/s



Fig

11.2 Description of module 2

11.2.1 Code: MET 302 / MET 05102/G5302

11.2.2 Name: Machine Elements I / BASIC MACHINE ELEMENT

11.2.3 Number of Credits: 6

11.2.4 Sub enabling outcome:

- Ability to identify and differentiate types of joints.
- Ability to design joints.
- Ability to determine forces and stresses on spur gears.
- Ability to design pulleys for a given belt system.
- Ability to design shafts & axles

11.2.5 Prerequisite module: *None*

11.2.6 Learning Context:

The module will conducted through lectures, studio tutorials and studio work. Design members of staff will supervise design project work. In some instances an industrial designer would augment the team particularly if the project were heavily biased towards a product requiring particular aesthetic appeal

Content:

Permanent joints: Design and strength of riveted joints, design and strength of welded joints, design and strength of adhesive joints, design and strength of soldered joints, applications, drawing symbols for welded joints.

Shafts: Types of shafts and axles, design, strength, materials.

Temporary joints: The screw threads, types of screw threads and their applications, design and strength of threaded joints, pins, types of pins, design and strength of pins, keys and keyways, splined and serrated shafts, design and strength of keys and key ways, press connections and applications, selection of fits for press connections, locking rings.

Geometry and design of tooth profile: Construction of tooth profile (involutes method), main dimensions of teeth and gear wheels.

11.2.7 Learning Materials

Chalkboard, Overhead Projectors, flip charts, Audio Visual,

References:

[1] Jensen C.H, Engineering Drawing and Design, McGraw Hill.

[2] Dobrovolsky,V, Machine Elements, Mir.

[3] Black P.H and O.E Adams Jr, Machine Design McGraw Hill

[4] Bevan, Theory of Machines

[5] Jutz H, and E. Scharkus, Westerman Tables for Metal Trade, Wiley Eastern Private Ltd

[6] Rosenthal and G.P. Bishop, Elements of Mac line Design, McGraw Hill

[7] Ostrowsky, O: Engineering Drawing for Technicians Vol.1&2 Arnold Publishers.

[8] Pahl and Beite: Engineering Design. The Design Council London

[9] Bhandari, V.K. et al (1983), Drawing and Design: Data book for Mechanical Engineering

[10] Kenneth, S.E and R.B. McKee; (1991), Fundamentals of Component Design. McGraw Hill –International Edition

11,2.8 Integrated Methods of Assessment:

Continuous Assessment Components:	40%
End of Semester Examination:	60%