



Paper ID : 261770

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Subject Code: BME603

Roll No:

BTECH
(SEM. VI) THEORY EXAMINATION 2025-26
THEORY OF MACHINE

TIME: 3 HRS**M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A**1. Attempt all questions in brief.****02 x 7 = 14**

Q no.	Question	CO	Level
a.	What is Grubler's criteria?	1	K1
b.	Why the basic mechanisms start with four links?	1	K1
c.	Why the gears are known as positive drive?	2	K1
d.	Define the term pressure angle in CAM.	2	K1
e.	A flywheel reduces speed fluctuation from 10% to 2%. By what factor must its moment of inertia increase?	3	K1
f.	Define the term Sensitivity of governor.	4	K1
g.	What do you mean by a self-energizing brake and self-locking brake?	5	K1

SECTION B**2. Attempt any three of the following:****07 x 3 = 21**

Q no.	Question	CO	Level
a.	A crank and slotted lever mechanism used in a shaper has a centre distance of 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank. The radius of the crank is 120 mm. Find the ratio of the time of cutting to the time of return stroke.	1	K2
b.	Derive the expression for law of gearing and show that gear teeth with involutes profile satisfy the law of gearing.	2	K2
c.	What is a Turning Moment Diagram? Describe how it is constructed for a single-cylinder engine.	3	K2
d.	A system consists of four rotating masses of 180 kg, 260 kg, 220 kg, and 240 kg at radii of 0.18 m, 0.14 m, 0.22 m, and 0.28 m respectively. The angular positions between successive masses are 50°, 70°, and 140°. A balancing mass rotates at a radius of 0.18 m. Apply the principles of dynamic balancing to determine: (a) The magnitude of the balancing mass. (b) The angular position of the balancing mass.	4	K2
e.	What is a gyroscopic couple? Describe its effect on the stability of moving vehicles such as two-wheelers and four-wheelers on curved paths.	5	K2

SECTION C**3. Attempt any one part of the following:****07 x 1 = 07**

Q no.	Question	CO	Level
a.	In the mechanism shown in Fig., the slider C is moving to the right with a velocity of 1 m/s and an acceleration of 2.5 m/s ² . The dimensions of various links are AB = 3 m inclined at 45° with the vertical and BC = 1.5 m inclined at 45° with the horizontal. Determine: • The magnitude of vertical and horizontal component of the acceleration of	1	K2

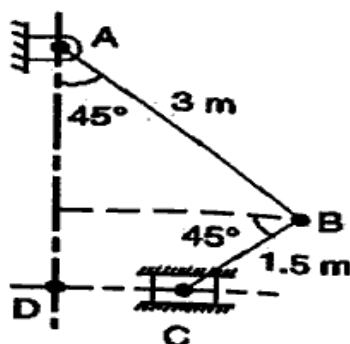
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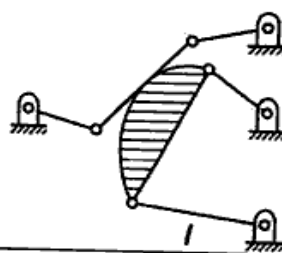
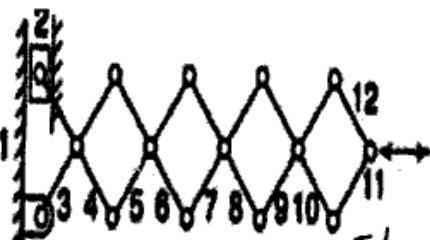
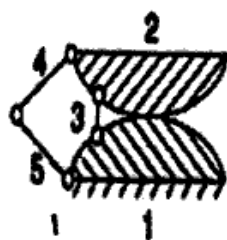
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- the point B, and
- The angular acceleration of the links AB and BC.



- b. Determine the Degree of freedom for the given Mechanism.



4. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	A cam drives a flat reciprocating follower in the following manner: During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam.	2	K2
b.	Drive an expression for the minimum number of teeth to avoid interference on both gear with suitable diagram.	2	K2

5. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m; crank angle, 1 mm = 1° . The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm ² . The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m.	3	K2
b.	The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of	3	K2



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energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds.

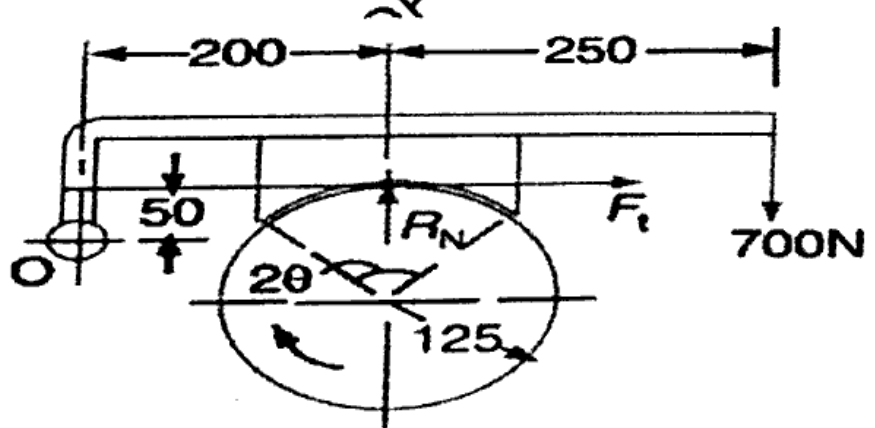
6. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	A porter governor has two balls each of mass 3kg and a central load of 15 kg. The arms are all 200 mm long, pivoted on the axis. If the maximum and minimum radii of rotation of balls are 160 mm and 200 mm respectively, find the range of the speed.	4	K2
b.	What is the function of governor? Explain the various type of governor with suitable diagram.	4	K2

7. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	What do you mean by a dynamometer? How are dynamometers classified?	5	K2.
b.	A single block brake is shown in Fig. The diameter of the drum is 250 mm and the angle of contact is 90°. If the operating force of 700 N is applied at the end of a lever and the coefficient of friction between the drum and the lining is 0.35, determine the torque that may be transmitted by the block brake.  All dimensions in mm.	5	K2