

Section C

5. (a) The mass of flywheel of an engine is 6 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 130 r.p.m., find the maximum and minimum speeds. 6
- (b) Explain belt transmission dynamometer. 4
6. (a) Explain the term sensitivity and hunting in case of centrifugal governor. 4
- (b) In a spring loaded Hartnell type governor, the extreme radii of rotation of the balls are 80 mm and 120 mm. The ball arm and the sleeve arm of the bell crank lever are equal in length. The mass of each ball is 2 kg. If the speeds at the two extreme positions are 400 and 420 r.p.m., find : 6
- (i) The initial compression of the central spring
- (ii) The spring constant.

Roll No.

Total Pages : 06

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B. Tech. EXAMINATION, 2022

Semester VI (CBCS)

DYNAMICS OF MACHINERY

ME-606

Time : 3 Hours

Maximum Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Section A, B, C and D. Q. No. 9 is compulsory.

Section A

1. (a) Explain D'Alembert's Principles. 4
- (b) Refer Fig. 1. Determine the couple C_2 on crank 2 to be applied for equilibrium of the system. Also determine the Resultant of forces F_{21} and F_{41} exerted on the frame of the engine : 6

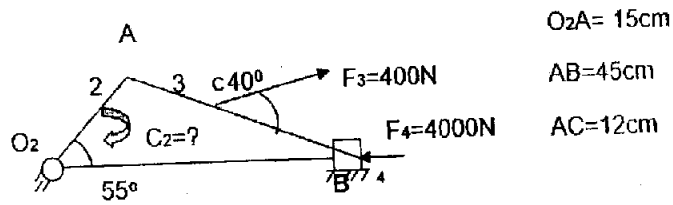
- (e) Define degree of freedom.
(f) What is shaking force in reciprocating engine ?
(g) What is sensitivity in governor ?
(h) Define radial engine.
(i) What is hydraulic dynamometer ?
(j) Define dynamic force. $10 \times 2 = 20$

Section D

7. (a) Define gyroscopic couple. 4
(b) An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it. 6
8. (a) What is difference between free and forced vibration ? 4
(b) Explain spring-mass damper system with suitable derivation. 6

(Compulsory Question)

9. (a) Why is isochronisms said to be a stage of infinite sensitivity ?
(b) Calculate the vertical height of a Watt governor when it rotates at 60 r.p.m.
(c) What is brake rope dynamometer ?
(d) Define angle of heel.



2. (a) Differentiate between Static and Dynamic Balancing. 4
- (b) A shaft carries five masses A, B, C, D and E which revolve at the same radius in planes which are equidistant from one another. The magnitude of the masses in planes A, C and D are 50 kg, 40 kg and 80 kg respectively. The angle between A and C is 90° and that between C and D is 135° . Determine the magnitude of the masses in planes B and E and their positions to put the shaft in complete rotating balance. 6

Section B

3. (a) What do you understand by dynamically equivalent masses? 4

- (b) A single cylinder reciprocating engine has speed 240 r.p.m., stroke 300 mm, mass of reciprocating parts 50 kg, mass of revolving parts at 150 mm radius 37 kg. If two third of the reciprocating parts and all the revolving parts are to be balanced, find : 6
- (i) The balance mass required at a radius of 400 mm
- (ii) The residual unbalanced force when the crank has rotated 60° from top dead centre.
4. (a) What is the difference between piston effort, crank effort and crank-pin effort? 4
- (b) The crank and connecting rod of a petrol engine, running at 1800 r.p.m. are 50 mm and 200 mm respectively. The diameter of the piston is 80 mm and the mass of the reciprocating parts is 1 kg. At a point during the power stroke, the pressure on the piston is 0.7 N/mm^2 , when it has moved 10 mm from the inner dead centre. Determine : 6
- (i) Net load on the gudgeon pin
- (ii) Thrust in the connecting rod
- (iii) Reaction between the piston and cylinder
- (iv) The engine speed at which the above values become zero.

- (e) Define degree of freedom.
(f) What is shaking force in reciprocating engine ?
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