III B. Tech I Semester Supplementary Examinations, August - 2021
DYNAMICS OF MACHINERY
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
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PART –A   (14 Marks)

1. a) Discuss the effect of precession motion on the stability of moving vehicles. [2M]
   b) Describe the film lubrication. [2M]
   c) Define the fluctuation of energy. [2M]
   d) Discuss the spring loaded governors with an application. [3M]
   e) What do you mean by force balancing of linkages? How is it achieved? [3M]
   f) Describe the vibration Isolation. [2M]

PART –B   (56 Marks)

2. a) Explain in detail, what way the gyroscopic couple affects the motion of an aircraft while taking a turn? [7M]
   b) Explain the static and dynamic force analysis of planar mechanisms. [7M]

3. a) Describe the operation of dynamometers with a neat sketch. [7M]
   b) A band and block brake has a drum of 1.0 m diameter and is fitted with 24 blocks, each having a contact angle of 10^0. The radial thickness of each block, measured from centre line of the band to the rim of the wheel is 70 mm. The band is designed to sustain a maximum force of 2000 N, The lever is arranged with l=800 mm, a= 100mm and b=80 mm. Calculate the force P required to be applied at the end of the lever if μ =0.4. Calculate the power loss due to friction if drum rotates at 240 rpm. [7M]

4. a) Describe the graphical method of considering the inertia of the connecting rod of a reciprocating engine. [7M]
   b) The turning moment diagram of a four-stroke engine is assumed to be represented by four triangles, the areas of which from the line of zero pressure are Suction stroke=520mm^2, Compression stroke= 1400mm^2, Expansion stroke=5200 mm^2, Exhaust stroke=720mm^2. Each mm^2 of area represents 4 Nm of energy. If the resisting torque is uniform, determine the mass of rim of a flywheel to keep the speed between 115 and 312 rpm when the mean radius of the rim is to be 1.25 m. [7M]

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5. a) Explain the Hartnell and Hartung with auxiliary springs. [7M]
    b) In a porter governor, each of the four arms is 300 mm long. The [7M]
        upper arms are pivoted on the axis of the sleeve, whereas the lower
        arms are attached to the sleeve at a distance of 35 mm from the axis
        of rotation. Each ball has a mass of 8 kg and the load on the sleeve is
        50 kg. Determine the range of speed of the governor for extreme radii
        of rotation of 325 mm and 340 mm.

6. a) Explain the balancing of V engine, and derive its equation. [7M]
    b) Show how the reciprocating parts of a single cylinder engine may be [7M]
        completely balanced, so far as primary and secondary effects are
        concerned, by means of revolving balance weights?

7. a) Explain the three rotor vibratory system and find the ratio of their [7M]
        amplitudes.
    b) A vibratory body of mass 150 kg supported on springs of total [7M]
        stiffness 1050 kN/m has a rotating unbalance force of 525 N at a
        speed of 6000 rpm. If the damping factor is 0.3, Determine:
        i)   the amplitude caused by the unbalance and its phase lag.
        ii) the transmissibility and
        iii) the actual force transmitted and its phase angle.

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