QUESTION BANK ON THEORY OF MACHINES

(MECHANICAL ENGINEERING - 4TH SEM)

PREPARED BY

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1 . Define kinematic chain (2 marks)

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2. What is lower pair ?(2 marks)
3. Give few examples of lower pair .(2 marks)
4. What is link ?(2 marks)
5. What is a machine ?(2 marks)
6. Differentiate between a machine and a structure .(2 marks)
7. What is the relationship between number of pairs and number of links ?(2 marks)
8. What is degree of freedom ?(2 marks)
9. What is contact ration in gears ? derive the expression for finding contact ratio ?(5 marks)
10. What is the pressure angle in cam ? explain its significance .(2 marks)
11. What are the different modes of power transmission ?(2 marks)
12. State the differences between cycloidal and involute teeth profile .(5 marks)
13. How many instantaneous centers are there in a four bar mechanism ? show all instantaneous center of four bar mechanism ?(5 marks)
14. Draw neat sketches of -------

A) Whitworth quick return mechanism
B) Slider crank mechanism
C) Ackerman's steering mechanism

15 . list the different types of cams . (4 marks)
16 . what are the limitations of knife edge follower ?(2 marks)
17 . what do you mean by a higher pair ?
18 . classify the various types of follower in detail (5 marks)
19 .what is hook joint ? explain it in detail (5 marks)
20 . what is gear ? explain the different types of gear .(5 marks)

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21. What is coriolis component of acceleration and represent it ?(5 marks)
22. Why tangent cam is not used with flat faced follower ?(2 marks)
23. What is the advantages of helical gears over spur gear ?(2 marks)
24. State and prove law of gearing ? with the help of diagram .(5 marks)
25. Two shafts are connected by spiral gears with velocity ratio 3:1 . the angle between the shaft is 45^0 and least distance between the shaft is 22.5 cm .the normal module is 5 mm and pinion is to have 20 teeth . determine the pitch circle diameter and the spiral angle if they are of same hand . (7 marks)
26. A shaft has an attached disc at the centre of its length . the disc has its centre of gravity located at a distance of 2 mm from the axis of the shaft . when the shaft is allowed to vibrate in its natural bow - shaped mode , it has a frequency of vibration of 10 rad / s . when the shaft is rotated at 300 rpm , it will whirl with what radius ?(5 marks)
27. What are the different types of constrained motion ?(2 marks)
28. What is the initial tension in a belt drive ?(2 marks)
29. What are the different types of instantaneous centre ?(2 marks)
30. Derive the fundamental equation for correct steering in steering gear mechanism .(5 marks)
31. State and explain law of gearing . (3 marks)
32. With the help of a neat sketch derive the equation for the length of path of contact , arc of contact and contact ratio for the two gear in mesh .(10 marks)
33. Derive the equation for the length of open belt drive . (10 marks)
34. Derive the expression for the length of closed belt drive . (10 marks)
35. A uniform bar of mass ‘m’ and length ‘L’ hangs from a frictionless hinge , it is released from the horizontal position . find the angular velocity of the center of mass ‘G’ , when it is in vertical position . solve by work energy principle . (10 marks)
36.