BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Dip.ME-2022
Course Name – Theory of Machines & Mechanisms
Course Code - DMEPC401
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Define the main function of a crank in a mechanism is to
a) Provide linear motion
b) Apply a fixed force
c) Change direction of motion
d) Store energy

(ii) select in actual machine, Mechanical Advantage is
a) Unity
b) Less than unity
c) Less than Velocity ratio
d) Greater than Velocity ratio

(iii) select the motion of a piston in the cylinder of a steam engine is an example of
a) completely constrained motion
b) incompletely constrained motion
c) successfully constrained motion
d) none of these

(iv) Predict a mechanism having 4 links with all binary pair have the number of instantaneous center equal to
a) 7
b) 5
c) 6
d) 4

(v) Identify the motion transmitted between the teeth of gears in mesh is
a) sliding
b) rolling
c) may be rolling or sliding depending upon the shape of teeth
d) partly sliding and partly rolling

(vi) Select due to slip of the belt, the velocity ratio of the belt drive
a) decreases
b) increases
c) does not change
d) none of these

(vii) Select the centrifugal tension in belts
a) increases power transmitted
b) decreases power transmitted
c) have no effect on the power transmitted
d) increases power transmitted upto a certain speed and then decreases

(viii) Select the type of gears used to connect two non-parallel non-intersecting shafts are
a) spur gears
b) helical gears

c) spiral gears
d) none of these

(ix) Select ,An imaginary circle which by pure rolling action, gives the same motion as the actual gear, is called

a) addendum circle
b) dedendum circle
c) pitch circle
d) clearance circle

(x) Select the size of a gear is usually specified by

a) pressure angle
b) circular pitch
c) diametral pitch
d) pitch circle diameter

(xi) Choose if the module of a gear be m, the number of teeth T and pitch circle diameter D, then

a) m = D/T
b) D = T/m
c) m = D/2T
d) none of these

(xii) Identify Involute profile is preferred to cycloidal because

a) the profile is easy to cut
b) only one curve is required to cut
c) the rack has straight line profile and hence can be cut accurately
d) none of the these

(xiii) Choose ,In a gear train, when the axes of the shafts, over which the gears are mounted, move relative to a fixed axis, is called

a) simple gear train
b) compound gear train
c) reverted gear train
d) epicyclic gear train

(xiv) Select a governor is used to drive a gramophone.

a) Watt governor
b) Porter governor
c) Pickering governor
d) Hartnell governor

(xv) Identify which is a spring-controlled governor.

a) Hartnell
b) Hartung
c) Pickering
d) all of these

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain - (i) Height of Governor (ii) Centrifugal Force of Governor (iii) Radius of rotation of Governor (3)
3. Explain - (i) Binary Joint (ii) Rolling Pairs (iii) Completely constrained motion (3)
4. Differentiate between Belt Drive and Gear Drive. (3)
5. Describe different types of constrained motion. (3)
6. Illustrate Gear Ratio and Train Value. (3)

OR

Illustrate law of gearing. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. The speed ratio of a reverted gear train is to be 15. The module of gears 1 and 2 is 3 mm and that of gears 3 and 4 is 2.5 mm. estimate the suitable number of teeth for the gears. The centre distance between gear shafts is 250 mm. (5)
8. Deduce an expression of equivalent spring stiffness when two springs (stiffness K1 and K2) are connected in series. (5)
9. Define: (a) Coefficient of Fluctuation of Energy (b) Coefficient of Fluctuation of Speed. (5)
10. Draw and explain a turning moment diagram for a four stroke I.C. Engine. (5)
11. Illustrate the term Degree of Freedom. Write down Kutzbach criterion for degree of freedom of a planar mechanism. (5)
12. Draw a radial cam profile with reciprocating roller follower and showing its nomenclature. (5)

OR

Draw the displacement, velocity and acceleration distribution diagram in Simple Harmonic Motion (SHM) Follower. (5)

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