

Seat No: _____

Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF AGRICULTURE
B.Tech. Agriculture Engineering, Summer 2018 - 19 Examination

Semester: 2

Subject Code: 20103158

Subject Name: Theory of Machines

Date: 24/04/2019

Time: 2:00pm to 4:00pm

Total Marks: 50

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1

A) Fill in the blanks (Each of 0.5 Mark)

(05)

- i) Each part of a machine, which moves relative to some other part, is known as a _____
- ii) Due to slip of the belt, the velocity ratio of the belt drive _____
(increase, decrease, not change)
- iii) The angular velocity of the link AB may be found by $\omega_{AB} = V_{AB}/AB^2$ True or False
- iv) The relative velocity of point A with respect to B (V_{AB}) and the relative velocity of point B with respect to A (V_{BA}) are equal in magnitude but opposite in direction, True or False
- v) Unit of Linear Velocity _____
- vi) Two or more gears are made to mesh with each other to transmit power from one shaft to another. Such a combination is called _____
- vii) The speed ratio (or velocity ratio) of gear train is the ratio of the speed of the driver to the speed of the driven or follower and ratio of speeds of any pair of gears in mesh is the inverse of their number of teeth. True or False
- viii) The friction, experienced by a body, when at rest is called as _____ friction
- ix) The function of a governor is _____
- x) A device which controls the speed variations caused by the fluctuation of the engine turning moment during each cycle of operation is called as _____

B) Multiple Choice Questions (Each of 0.5 Mark)

(10)

- i) In a reciprocating steam engine, which of the following forms a kinematic link?
(a) cylinder and piston (b) piston rod and connecting rod
(c) crank shaft and flywheel (d) flywheel and engine frame
- ii) The relation between the number of pairs (p) forming a kinematic chain and the number of links (l) is
(a) $l = 2p - 2$ (b) $l = 2p - 3$ (c) $l = 2p - 4$ (d) $l = 2p - 5$

- iii) A kinematic chain is known as a mechanism when
 (a) none of the links is fixed (b) one of the links is fixed
 (c) two of the links are fixed (d) two of the links are fixed
- iv) The lead screw of a lathe with nut forms a
 (a) sliding pair (b) rolling pair (c) screw pair (d) turning pair
- v) The direction of linear velocity of any point on a link with respect to another point on the same link is
 (a) parallel to the link joining the points (b) perpendicular to the link joining the points
 (c) at 45° to the link joining the points (d) none of these
- vi) The magnitude of linear velocity of a point B on a link AB relative to point A is
 Where ω = Angular velocity of the link AB .
 (a) ωAB (b) $\omega(AB)^2$ (c) $\omega^2 AB$ (d) $(\omega AB)^2$
- vii) The component of the acceleration, parallel to the velocity of the particle, at the given instant is called
 (a) radial component (b) tangential component
 (c) coriolis component (d) none of these
- viii) The coriolis component of acceleration is taken into account for
 (a) slider crank mechanism (b) four bar chain mechanism
 (c) quick return motion mechanism (d) none of these
- ix) The two parallel and coplanar shafts are connected by gears having teeth parallel to the axis of the shaft. This arrangement is called
 (a) spur gearing (b) helical gearing (c) bevel gearing (d) spiral gearing
- x) The size of a gear is usually specified by
 (a) pressure angle (b) circular pitch (c) diametral pitch (d) pitch circle diameter
- xi) 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) A differential gear in automobiles is used to
 (a) reduce speed (b) assist in changing speed
 (c) provide jerk-free movement of vehicle (d) help in turning
- xiii) The maximum fluctuation of energy is the
 (a) sum of maximum and minimum energies
 (b) difference between the maximum and minimum energies
 (c) ratio of the maximum energy and minimum energy
 (d) ratio of the mean resisting torque to the work done per cycle
- xiv) In a turning moment diagram, the variations of energy above and below the mean resisting torque line is called
 (a) fluctuation of energy
 (b) maximum fluctuation of energy
 (c) coefficient of fluctuation of energy
 (d) none of the above

- xv) In which of the following drives, there is no slip
 (a) Open belt drive (b) Crossed belt drive (c) Rope drive (d) Chain drive
- xvi) Why is an idler gear used in gear trains?
 (a) To obtain minimum centre distance between driving and driven shaft
 (b) To have required direction of rotation
 (c) Both (a) and (b)
 (d) None of the above
- xvii) The angle of inclination of the plane, at which the body begins to move down the plane, is called
 (a) angle of friction (b) angle of repose (c) angle of projection (d) None of above
- xviii) The height of a Watt's governor (in meters) is equal to
 (a) $8.95/N^2$ (b) $89.5/N^2$ (c) $895/N^2$ (d) $8950/N^2$
- xix) When the elements of the pair are kept in contact by the action of external forces, the pair is said to be a
 (a) lower pair (b) higher pair (c) self-closed pair (d) force closed pair
- xx) When a body rolls over another, friction force experienced by the body is known as _____ friction
 (a) sliding (b) rolling (c) static (d) none of the mentioned

Q.2

A) Define the following (Any five out of seven questions) (05)

- (1) Machine
- (2) kinematics chain
- (3) Flywheel
- (4) Coefficient of fluctuation of speed
- (5) Sensitiveness of governor
- (6) Slip for belt drive
- (7) Friction

B) Answer the following (Any five out of seven questions) (05)

- (1) What is kinematics?
- (2) What is higher pair?
- (3) What are the applications of gear drive?
- (4) Write various Types of friction.
- (5) What is height of governor?
- (6) What is Coefficient of Fluctuation of Energy?
- (7) What is stability of governor?

Q.3 Write Short notes (Any five out of six questions) (10)

- (1) Explain about Kinematic link and its types.
- (2) Explain about flywheel and its function.
- (3) What are the classifications of Gear according to position of axes of the shaft?
- (4) Explain about compound gear train.
- (5) What is belt drive? Classify belt drive.
- (6) Write about bearings in detail.

Q.4 Long Questions (Any three out of four questions) (15)

- (1) Explain Turning moment diagram for a four stroke cycle IC engine.
- (2) Write short note about governor and its types
- (3) Explain about power transmission devices.
- (4) Write about friction and Types of friction