Mark Scored:

KATHMANDU UNIVERSITY
End of Semester Examination
August/September, 2017

Level : B. E.
Year : II

Course : MEEG 206
Semester: II

Exam Roll No. :

Time: 30 min

F. M. : 20

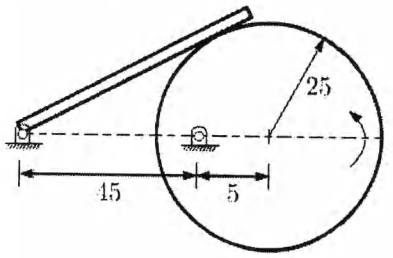
Registration No. :

Date : SEP 10 2017

SECTION "A"
[20 Q × 1 = 20 marks]

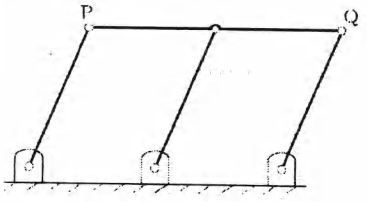
Complete *ALL* questions in this section. Indicate your answer with an X in the appropriate box.

1. In the mechanism given below, if the angular velocity of the eccentric circular disc is 1 rad/s, the angular velocity (rad/s) of the follower link for the instant shown in the Figure is (Note. All dimensions are in mm).



[ ] 0.05 [ ] 0.1 [ ] 5.0 [ ] 10.0

2. A double-parallelogram mechanism is shown in the Figure below. Note that PQ is a single link. The mobility of the mechanism is

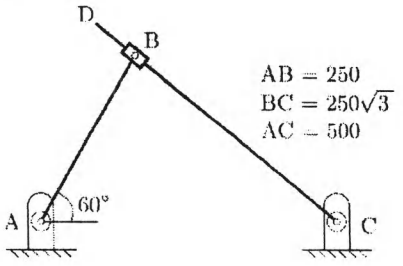


[ ] -1 [ ] 0 [ ] 1 [ ] 2

3. There are two points P and Q on a planar rigid body. The relative velocity between the two points
[ ] should always be along PQ
[ ] can be oriented along any direction
[ ] should always be perpendicular to PQ
[ ] should be along QP when the body undergoes pure translation

4. Tooth interference in an external involute spur gear pair can be reduced by
[ ] decreasing center distance between gear pair [ ] decrease module
[ ] decreasing pressure angle [ ] increasing number of gear teeth

5. For the configuration shown, the angular velocity of link AB is 10 rad/s counterclockwise. The magnitude of the relative sliding velocity (in m/s) of slider B with respect to rigid link CD is



[ ] 0.00 [ ] 0.86 [ ] 1.25 [ ] 2.50

6. In a cam design, the rise motion is given by a simple harmonic motion (SHM) $s = h/2\,(1 - cos(\pi\theta/\beta))$. Where 'h' is total rise, θ is camshaft angle, β is the total angle of the rise interval. The jerk is given by

[ ] $h/2\,(1 - cos(\pi\theta/\beta))$ [ ] $\pi h/2\beta sin(\pi\theta/\beta)$
[ ] $\pi^2 h/2\beta^2\, cos(\pi\theta/\beta)$ [ ] $-\pi^3 h/2\beta^3\, sin(\pi\theta/\beta)$

7. For an under damped harmonic oscillator, resonance
[ ] occurs when excitation frequency is greater than undamped natural frequency
[ ] occurs when excitation frequency is less than undamped natural frequency
[ ] occurs when excitation frequency is equal to undamped natural frequency
[ ] never occurs

8. In a four-bar linkage, S denotes the shortest link length, L is the longest link length, P and Q are the lengths of other two links. At least one of the three moving links will rotate by 360^0 if

[ ] $S + L \leq P + Q$ [ ] $S + L > P + Q$ [ ] $S + P \leq L + Q$ [ ] $S + P > L + Q$

9. In a cam-follower mechanism, the follower needs to rise through 20 mm during 60^0 of cam rotation, the first 30^0 with a constant acceleration and then with a deceleration of the same magnitude. The initial and final speeds of the follower are zero. The cam rotates at a uniform speed of 300 rpm. The maximum speed of the follower is
[ ] 0.60 m/s [ ] 1.2 m/s [ ] 1.68 m/s [ ] 2.40 m/s

10. A rotating disc of 1 m diameter has two eccentric masses of 0.5 kg each at radii of 50 mm and 60 mm at angular positions of 0^0 and 150^0, respectively. A balancing mass of 0.1 kg is to be used to balance the rotor. What is the radial position of the balancing mass?
[ ] 50 mm [ ] 120 mm [ ] 150 mm [ ] 280 mm

11. The minimum number of links in a single degree-of-freedom planar mechanism with both higher and lower kinematic pairs is
[ ] 2 [ ] 3 [ ] 4 [ ] 5

12. When two shafts are neither parallel nor intersecting, power can be transmitted by using
[ ] a pair of spur gears [ ] a pair of helical gears
[ ] an Oldham's coupling [ ] a pair of spiral gears

13. What is the number of instantaneous centers of rotation for a 6-link mechanism?
[ ] 4 [ ] 6 [ ] 12 [ ] 15

14. The coupling used to connect two shafts with large angular misalignment is
[ ] a flange coupling [ ] an Oldham's coupling
[ ] a flexible bush coupling [ ] a hooke's joint

15. A system in dynamic balance implies that
[ ] the system is critically damped [ ] there is no critical speed in the system
[ ] the system is also statically balanced [ ] there will be absolutely no wear of bearings

16. Static balancing is satisfactory for low speed rotors but with increasing speeds, dynamic balancing becomes necessary. This is because, the
[ ] unbalanced couples are caused only at higher speeds
[ ] unbalanced forces are not dangerous at higher speeds
[ ] effects of unbalances are proportional to the square of the speed
[ ] effects of unbalances are directly proportional to the speed

17. A system of masses rotating in different parallel planes is in dynamic balance if the resultant
[ ] force is equal to zero
[ ] couple is equal to zero
[ ] force and the resultant couple are both equal to zero
[ ] force is numerically equal to the resultant couple, but neither of them need necessarily be zero

18. Which one of the following causes the whirling of shafts?
[ ] non-homogeneity of shaft material [ ] misalignment of bearings
[ ] fluctuation of speed [ ] internal damping

19. Whirling speed of a shaft coincides with the natural frequency of its
[ ] longitudinal vibration [ ] transverse vibration
[ ] torsional vibration [ ] coupled bending torsional vibration

20. The critical speed of a rotating shaft depends upon
[ ] mass [ ] stiffness
[ ] mass and stiffness [ ] mass, stiffness and eccentricity