Subjective questions on MET-08

1. What is brake? What are its various classifications? Write in detail.
2. What is dynamometer? What are its various classifications?
3. Define Prony Brake dynamometer with the help of neat sketch
4. What are the difference between brake and Clutch? What are the various factor affecting braking?
5. Please write in detail of any kind of brake and define its working with neat sketch.
6. What is belt drive? What are the various selection criteria for the selection of belt Drive?
7. Write briefly the various types of belts used for the transmission of power.
8. Obtain an expression for the length of a belt in 1. an open belt drive ; and 2. a cross belt drive.
9. Write advantages and disadvantages of chain and ripe drive.
10. Derive Velocity ratio of belt drive.
11. Explain the phenomena of 'slip' and 'creep' in a belt drive.
12. Two parallel shafts 6 metres apart are provided with 300 mm and 400 mm diameter pulleys and are connected by means of a cross belt. The direction of rotation of the follower pulley is to be reversed by changing over to an open belt drive. How much length of the belt has to be reduced?
13. An engine shaft running at 120 r.p.m. is required to drive a machine shaft by means of a belt. The pulley on the engine shaft is of 2 m diameter and that of the machine shaft is 1 m diameter. If the belt thickness is 5 mm ; determine the speed of the machine shaft, when 1. there is no slip ; and 2. there isa slip of 3%.
14. Discuss relative merits and demerits of belt, rope and chain drive for transmission of power.
15. What is Gear? What are its classifications?
16. What are the various advantages and disadvantages of Gear drive?
17. Draw a neat sketch of Gear and write the name of its various parts.

18. Define followings-
    I. Circular pitch
    II. Diametral pitch
    III. Module
    IV. Pitch Circle diameter
19. What is Governor? What are its various classification?

20. What is the function of a governor? How does it differ from that of a flywheel?

21. Define following
    I. Height of a governor
    II. Equilibrium speed
    III. Mean equilibrium speed
    IV. Maximum and minimum equilibrium speeds.

22. Sleeve lift

23. Define in detail about Watt governor with the help of neat sketch.

24. Derive formula for the height of the governor.

25. Calculate the vertical height of a Watt governor when it rotates at 60 r.p.m.Also find the change in vertical height when its speed increases to 61 r.p.m.

26. State the different types of governors. What is the difference between centrifugal and inertia type governors? Why is the former preferred to the latter?

27. Define and explain the following terms relating to governors :
    1. Stability, 2. Sensitiveness, 3. Isochronism, and 4. Hunting

28. An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when 1. there is no slip, and 2. there is a slip of 2% at each drive.

29. Two parallel shafts 6 metres apart are provided with 300 mm and 400 mm diameter pulleys and are connected by means of a cross belt. The direction of rotation of the follower pulley is to be reversed by changing over to an open belt drive. How much length of the belt has to be reduced?

30. An open belt 100 mm wide connects two pulleys mounted on parallel shafts with their centres 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m. find the maximum power that can be transmitted.

31. Calculate the vertical height of a Watt governor when it rotates at 60 r.p.m. Also find the change in vertical height when its speed increases to 61 r.p.m. The length of the upper arm of a Watt governor is 400 mm and its inclination to the vertical is 30°.Find the percentage increase in speed, if the balls rise by 20 mm.

32. Four masses m1, m2, m3 and m4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m.

33. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions.