Unit-III Worksheet

C4.1 In an engine governor of the Porter type, the upper and lower arms are 200 mm and 250 mm respectively and pivoted on the axis of rotation. The mass of the central load is 15 kg, the mass of each ball is 2 kg and friction of the sleeve together with the resistance of the operating gear is equal to a load of 25 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40°, find, taking friction into account, range of speed of the governor.

C4.2 A rigid motor has all its unbalance in one plane and can be considered to consist of 3 masses m1=5kg; m2=3kg at an angle of 165o CCW from m1&m3=8kg @ angle 85oCW from m1. The radii r1=20cm, r2=8cm & r3=14cm. Determine the balancing mass required at radius 10cm. Specify the location of this mass with respect to m1 by using graphical method.

1. A governor is said to be isochronous when equilibrium speed of all radii of rotation of the balls with in the working range

a. Is constant b. Varies uniformly c. Is not constant c. None of the above

(Ans: a)

2. A Hartnell governor is a governor of the

a. inertia type b. pendulum type c. spring controlled type d. dead weight type

(Ans:c)

3. Which one of the following is a Dead weight type governor?

a. Porter Governor b. Hartnell Governor c. Wilson-Hartnell Governor d. Hartung Governor

(Ans: a)

4. Height of a Governor is distance measured from

a. the centre of two balls mass

b. the centre of balls mass to the point of intersection of upper arms

c. the centre of balls mass to the point of intersection of lower links

d. the point of intersection of upper arms to the point of intersection of lower links

(Ans: b)

5. Which of the following is pendulum type of Governor?

a. Watt Governor b. Proell Governor c. Porter Governor d. Hartnell Governor

(Ans: a)

6. Which of the following Governor is not suitable for High speeds

a. Watt Governor b. Hartnell Governor c. Wilson-Hartnell Governor d. Hartung Governor

(Ans: a)

7. The sensitiveness of a Governor is

a. (N2+N1)/N b. (N2-N1)/N c. (N2+N1) x N d. (N2-N1) x N

Where N1=Minimum equilibrium speed

N2=Maximum equilibrium speed

N=Mean speed

(Ans: b)

8. Which of the following Governor can never be isochronous?

a. Watt Governor b. Proell Governor c. Porter Governor d. Hartnell Governor

(Ans: c)

9. A system of masses rotating in different parallel planes is in dynamic balance if the resultant

a. force is equal to zero b. couple is equal to zero

c. force and the resultant couple are both equal to zero d. force is numerically equal to the couple

(Ans: c)

10. For isochronous, spring controlled governor, the controlling force with increase in radius of rotation.....

a. increase b. decreases c. remains constant d. behaves in unpredictable way

(Ans: c)

11. If the controlling force line for a spring controlled governor when produced intersects the y-axis

at the origin, then governor is said to be.....

a. stable b. unstable c. isochronous d. sensitive

(Ans: c)

12. The governor used in gramophone is of the following type.....

a. Pickering b. porter c. hartnell d. watt

(Ans: a)

13. Sensitiveness of governor is defined as.....

a. range of speed/mean speed b. mean speed/range of speed

c. mean speed x range of speed d. 2 X mean speed/range of speed

(Ans: a)

14. The function of a governor is to.....

a. store energy and give up whenever required

b. regulate the speed during one cycle of prime mover

c. decrease variation of speed

d. increase variation of speed

e. adjust variation of speed by varying the input to the engine

(Ans: e)

15. The term "effort of governor" refers to.....

a. centrifugal force of balls

b. useful power developed

c. force acting on sleeve for given % change of speed

d. minimum force required on sleeve for % change of speed

(Ans: c)

16. The ratio of the height of a Porter governor (when the length of arms and links are equal) to the

height of Watt's governor is

a) m/m+M b) M/m+M c) m + M/m d) m + M/M

(Ans: c)

17. A governor is said to be hunting, if the speed of the engine

a) remains constant at the mean speed

b) is above the mean speed

c) is below the mean speed

d) fluctuates continuously above and below the mean speed

(Ans: c)

18. Which of the following statements are associated with complete dynamic balancing of rotating

systems?

1. Resultant couple due to all inertia forces is zero.

2. Support reactions due to forces are zero but not due to couples.

3. The system is automatically statically balanced.

4. Centre of masses of the system lies on the axis of rotation.

a) 1, 2, 3 and 4

b) 1, 2, and 3 only

c) 2, 3 and 4 only

d) 1, 3 and 4 only

(Ans: d)

19. The magnitude of swaying couple due to partial balance of the primary unbalancing force in locomotive is

a) inversely proportional to the reciprocating mass

b) directly proportional to the square of the distance between the centre lines of the two

cylinders

c) inversely proportional to the distance between the centerlines of the two cylinders

d) directly proportional to the distance between the centerlines of the two cylinders

(Ans: d)

20. In a locomotive, the ratio of the connecting rod length to the crank radius is kept very large in order to

a) minimize the effect of primary forces

b) minimize the effect of secondary forces

c) have perfect balancing

d) start the locomotive conveniently

(Ans: d)

21. In balancing of single-cylinder engine, the rotating unbalance is

a)completely made zero and so also the reciprocating unbalance

b)completely made zero and the reciprocating unbalance is partially reduced

c)partially reduced and the reciprocating unbalance is completely made zero

d)partially reduced and so also the reciprocating unbalance

(Ans: b)

22. In case of partial balancing of locomotives, the maximum magnitude of the unbalanced force

perpendicular to the line of stroke is called hammer blow and this has to be limited by proper choice of the balancing mass and its radial position.

a) True

b) False

(Ans: a)

23. Multi-cylinder engines are desirable because

a) only balancing problems are reduced

b) only flywheel size is reduced

c) both (a) and (b)

d) none of the mentioned

(Ans: c)

24. When the primary direct crank of a reciprocating engine makes an angle θ with the line of stroke, then the secondary direct crank will make an angle of . . . . . with the line of stroke.

a) θ /2

b) θ

c) 2 θ

d) 4 θ

(Ans: c)

25. Secondary forces in reciprocating mass on engine frame are

a) of same frequency as of primary forces

b) twice the frequency as of primary forces

c) four times the frequency as of primary forces

d) none of the mentioned

(Ans: b)

26. The primary unbalanced force is maximum when the angle of inclination of the crank with the

line of stroke is

a) 0°

b) 90°

c) 180°

d) 360°

(Ans: c)

27. The partial balancing means

a) balancing partially the revolving masses

b) balancing partially the reciprocating masses

c) best balancing of engines

d) all of the mentioned

(Ans: b)

28. In order to facilitate the starting of locomotive in any position, the cranks of a locomotive, with

two cylinders, are placed at _____ to each other.

a) 45°

b) 90°

c) 120°

d) 180°

(Ans: b)

29. If c be the fraction of the reciprocating parts of mass m to be balanced per cyclinder of a steam

locomotive with crank radius r, angular speed ω, distance between centre lines of two cylinders

a, then the magnitude of the maximum swaying couple is given by

a) 1 – c / 2 mrω2a

b) 1 – c / √2mrω2a

c) √2(1 – c)mrω2a

d) none of the mentioned

(Ans: b)

30. The swaying couple is maximum or minimum when the angle of inclination of the crank to the

line of stroke (θ) is equal to

a) 45° and 135°

b) 90° and 135°

c) 135° and 225°

d) 45° and 225°

(Ans: d)

31. The swaying couple is due to the

a) primary unbalanced force

b) secondary unbalanced force

c) two cylinders of locomotive

d) partial balancing

(Ans: a)

32. In a locomotive, the maximum magnitude of the unbalanced force along the perpendicular to the

line of stroke, is known as

a) tractive force

b) swaying couple

c) hammer blow

d) none of the mentioned

(Ans: c)