MODEL QUESTION PAPER

BE MECHANICAL

Elective II – **Tribology** (MCQ)

1-The following is (are) the example(s) of static friction

A. Shoe brake applied to a vehicle
B. Shoe brake applied to a train
C. Dry grinding stone abrades the surface of metal
D. All of the above

Ans (D)

2-As per laws of dry friction, the frictional force

A. depends upon the nature of sliding surface
B. is independent of the sliding velocity
C. is directly proportional to the load
D. All of the above

Ans (D)

3-Lubricant converts

A. Solid friction into liquid friction
B. Liquid friction into solid friction
C. both ‘a’ and ‘b’
D. None of the above

Ans (A)

4-The following is not a type of sliding contact bearing

A. Ball bearing
B. Journal bearing
C. Bush bearing
D. Thrust bearing

Ans (A)

5- The following is not a type of roller contact bearing

A. Ball bearing
B. Journal bearing
C. Roller bearing
D. All of the above

Ans (B)

6-In thrust bearings, the load acts

A. perpendicular to the axis of shaft
B. in axial direction
C. both ‘a’ and ‘b’
D. None of the above

Ans (B)

7-Boundary friction conditions may develop in journal bearings, when shaft passes through zero speed during

A. starting
B. stopping
C. reversing
D. All of the above

Ans (D)

8-The following lubricants are obtained by fractional distillation of petroleum

A. Mineral oils
B. Fatty oils
C. Solid lubricants
D. All of the above

Ans (A)

9-For low pressure and low speeds, we use

A. Mineral oils
B. Semi-solid lubricants
C. Solid lubricants
D. All of the above

Ans (C)

10-The pour point test is employed to indicate the suitability of oil for ____ temperature operations.

A. low
B. high
C. both ‘a’ and ‘b’
D. None of the above

Ans (A)

11-The flash point of lubricant must be _____ the working temperature.

A. well below

B. well above
C. equal to
D. None of the above

Ans (B)

12-Specific gravity of lubricant can be measured by using

A. Hydrometer
B. Viscometer
C. Anemometer
D. Pyranometer

Ans (A)

13-API number of water is

A. 1
B. 5
C. 10
D. 20

Ans (C)

14-The colour code for various grades of lubricants is as follows

Grade of lubricant	Colour code
a. Spindle oil	1. Red
b. Heavy-medium	2. Orange
c. Heavy/Extra heavy	3. Brown
d. Grease	4. Yellow

The correct order is

A. a-3, b-1, c-2, d-4
B. a-4, b-3, c-1, d-2
C. a-1, b-2, c-3, d-4
D. a-4, b-3, c-2, d-1

Ans (B)

15-The bi-weekly lubrication is indicated by

A. rectangle
B. triangle
C. circle
D. hexagon

Ans (C)

16-The monthly lubrication is indicated by

A. rectangle
B. triangle
C. circle
D. hexagon

Ans (A)

17-Lubrication Oil from automobile machines come under ____ oil.

A. Clean oil
B. Less dirty
C. More dirty
D. Highly dirty

Ans (D)

18-The six monthly lubrication is indicated by

A. rectangle
B. triangle
C. circle
D. hexagon

Ans (D)

19- In which period was the word tribology coined after realizing significant losses due to lack of knowledge of friction and wear and a need for an interdisciplinary approach was considered?

A. 1960

B. 1966

C. 1964

D. 1970

Ans (B)

20- Out of the following disciplines which one is not considered for an interdisciplinary approach in tribology?

A. Solid and Fluid mechanics.

B. Chemistry.

C. Material Science.

D. Industrial Engineering.

Ans (D)

21- The meaning of the Greek word “Tribos” from which the word Tribology is formed is

A. Rubbing.

B. Movement.

C. Fluid.

D. Heat.

Ans (A)

22 - Which one of the following is NOT the purpose of Tribology?

A. Improve service life.

B. Increase safety and reliability.

C. Reduce fatigue.

D. Increase heat generation.

Ans (D)

23 - Asperities are basically

A. Sharp tips on surface.

B. Edge of a surface.

C. Corner of a surface.

D. Hole in a surface.

Ans (A)

24 - Which one is not a standard method for quantifying surface roughness?

A. Root mean square roughness.

B. Average roughness.

C. Flatness tolerance(GD&T).

D. Rating method on any arbitrary scale.

Ans (D)

25 - Which one of the following statement is true?

A. Wear rate increases with increasing load.

B. Wear rate decreases with increasing temperature.

C. Wear rate decreases with increasing speed.

D. Wear rate is independent of load/temperature.

Ans (A)

26 - The purpose of lubricant filter system is

A. To remove the debris from the lubricant.

B. To enhance the viscosity of lubricant.

C. Reduce the temperature of lubricant.

D. Reduce the quantity of lubricant.

Ans (A)

27 - Which one of the following parameter is not included by Stribeck curve?

A. Viscosity of the lubricant.

B. Speed of the surfaces.

C. Load at the interface.

D. Surface roughness.

Ans (D)

28 - Which one of the following statements is NOT true about friction?

A. Friction is tangential resistance to motion.

B. Friction is dependent upon the surface of the content.

C. Friction is greater on rough surface.

D. Friction does not decrease with lubrication.

Ans (D)

29 - Coefficient of friction is independent of

A. Temperature.

B. Surface Roughness.

C. Hardness.

D. Surface area of contact.

Ans (D)

30 - Phenomenon of stick-slip occurs because of

A. Large difference between static and kinetic coefficients of friction.

B. Additional force requirement to move the object.

C. Increase in hardness of surfaces.

D. Lubrication is applied on the surfaces.

Ans (A)

31 - Adhesion component of dry friction is negligible at interface of

A. High temperature surfaces.

B. Lubricated tribo pair.

C. Rough surfaces.

D. Extra smooth surfaces.

Ans (B)

32 - Cold weld between two surfaces happens because of

A. Excessive lubrication.

B. Adhesion between two surfaces.

C. Relatively high surface roughness.

D. Low temp on area of contact.

Ans (B)

33 - As per the ploughing theory of friction, which of the following statements is not true?

A. Slope of asperities govern the friction force.

B. Sharp asperities causes more friction compared to round or spherical asperities.

C. Asperities on one surface interact with the asperities or valleys on the other surface.

D. An asperity of softer surface causes ploughing on the harder surface.

Ans (D)

34 - The formation of junction growth can be reduced by

A. Lubrication of the surfaces.

B. Increasing the surface finish of the rubbing surfaces.

C. Annealing the surfaces.

D. All of above.

Ans (A)

35 - Deformation of asperities causes

A. Increase in friction.

B. Decrease in friction.

C. Can increase or decrease friction.

D. No effect.

Ans (C)

36 - Ploughing effect causes

A. Piercing and penetration of the soft surface by the asperities of the hard surface.

B. Increasing in friction.

C. Both (a) & (b).

D. None of these.

Ans (C)

37 - Coefficient of friction due to rolling is generally

A. Greater than coefficient of sliding friction.

B. Lesser than coefficient of sliding friction.

C. Equal to sliding friction.

D. May be greater or smaller compared to sliding friction.

Ans (D)

38 - Which of the following are the major contributors to rolling friction?

A. Micro-slip effect within the contact area.

B. Elastic hysteresis of the contacting materials.

C. Plastic deformation of the materials& adhesion effects in the contact.

D. All of the above.

Ans (D)

39 - Which one of the following is truefor ball bearings?

I. Sliding occurs between cage and balls.

II. Lubricants such as grease are used to reduce friction within ball bearing.

III. Cages are meant to bear the load.

A. Both (I) and (II).

B. Both (I) and (III).

C. Both (II) and (III).

D. All three (I), (II) and (III).

Ans (A)

40 - If an automobile tire is not filled up to the optimum pressure level it means:

A. There would be less hysteresis loss.

B. Rolling friction would be lower.

C. More steering controllability.

D. None of these.

Ans (C)

41 - To avoid the phenomenon of stick slip due to friction instability which of the following is the right approach?

A. Increase the operation speed.

B. Decrease the operation speed.

C. Operation speed does not have any effect on the stick slip process.

D. Increase the difference between static and kinetic coefficient of friction.

Ans (A)

42 - In a mechanical system, negative damping due to friction instability causes

A. Increase in vibration amplitude over a period of time.

B. Decrease in vibration amplitude over a period of time.

C. Amplitude remains unchanged with time.

D. None of these.

Ans (A)

43- Zero wear increases performance because

A. It causes polishing of surface.

B. Size of surface asperities increases.

C. It removes lubrication from the surface.

D. It increases load bearing capacity of the surface.

Ans (A)

44 - Which of the following is NOT true about measurable wear?

A. Measurable wear is undesirable.

B. It can cause vibration and noise.

C. Measurable wear may roughen the surfaces.

D. It polishes the surfaces.

Ans (D)

45- Which of the following is NOT true about pitting on the gear surface?

A. It is a surface fatigue failure.

B. It occurs due to repeated loading of the tooth surface.

C. It occurs because contact stress exceeds than the surface fatigue strength of the material.

D. It occurs because contact stress exceeds the compressive strength of material.

Ans (D)

46- With increase in bearing clearance the load capacity of the bearing

A. Increases.

B. Decreases.

C. Does not change.

D. First decreases and then increases.

Ans (B)

47- Which among the following is not an adhesive wear mechanism?

A. Galling

B. Scoring.

C. Scuffing.

D. Polishing.

Ans (D)

48- To minimize the sliding friction, shear strength of the lubricant compared to the shear strength of the tribo-surfaces should be:

A. Higher.

B. Lower.

C. Insignificant.

D. Equal.

Ans (C)

49- As per Archard's wear equation, wear volume in adhesive wear is independent of

A. Sliding distance of travel.

B. Load.

C. Hardness of the soft material.

D. Rolling distance.

Ans (D)

50- Seizure refers to

A. Binding and fastening together of the material.

B. Cracking on the surface.

C. Significant wear on the surface.

D. Significant plastic deformation.

Ans (A)

51- Causes of seizure are

A. Poor heat dissipation.

B. Poor lubrication.

C. Smaller clearances.

D. All of above.

Ans (D)

52- The thickness of the oxide layer formed on the surface is dependent upon

A. Rate of rupture of the oxide layer.

B. Time available to re-oxidise.

C. Rate of formation of oxide layer.

D. All of the above.

Ans (D)

53- Scratching is a form of

A. Abrasive wear.

B. Adhesive wear.

C. Corrosive wear.

D. Fatigue wear.

Ans (A)

54- Wear rate is lesser in 3-body abrasion as compared to 2-body abrasion because

A. Energy is consumed in rolling motion of free hard particles.

B. Only spherical asperities are involved in 3-body abrasion.

C. Size of the asperities is smaller in 3-body abrasion.

D. Generally hardness of free particles is very low.

Ans (A)

55- The property of MR fluid is

A. Viscosity thickening due to magnetic attraction among particles.

B. Viscosity thinning due to relative sliding.

C. Reduction in viscosity due to increase in temperature.

D. All of above.

Ans (D)

56- Which of the following represents correct sequence of corrosive wear?

i. Mechanical sliding at interface.

ii. Chemical reaction and formation of a reaction product (oxide, chloride).

iii. Wearing away of reaction product film.

A. (ii),(i),(iii)

B. (ii), (iii), (i)

C. (i), (iii), (ii)

D. (i), (ii), (iii)

Ans (A)

57- Erosive wear is a function of

A. Particle velocity.

B. Impact angle.

C. Size of abrasive.

D. All of above.

Ans (D)

58 - The purpose of lubrication is

A. To reduce friction.

B. To reduce wear.

C. Transfer heat produced.

D. All of above.

Ans (D)

59 - Which of the following is NOT a function of lubricant in IC engine?

A. Form a film to separate the surfaces.

B. Adhere to surface.

C. Withstand high temperature inside the cylinder.

D. Reduce the size of the asperities and improve the surface finish.

Ans (D)

60 - Synovial fluid is a lubricant that is found in

A. Human bone joints.

B. Gearboxes.

C. IC engines.

D. Rolling element bearings.

Ans (A)

61 - Which one of them is a correct combination?

1. Boundary lubrication.

2. Hydrodynamic lubrication.

3. Mixed lubrication.

4. Elastohydrodynamic lubrication.

(i) Dimensionless film thickness < 1.

(ii) Dimensionless film thickness lies between 1 and 3.

(iii) Dimensionless film thickness lies between 3 & 5.

(iv) Dimensionless film thickness is greater than 5.

A. 1-(i), 2-(iv), 3-(ii), 4-(iii).

B. 1-(iv), 3-(iii), 2-(i), 4-(ii).

C. 2-(i), 3-(iv), 4-(iii), 1-(ii).

D. 3-(iv), 2-(iii), 1-(i), 4-(ii).

Ans (A)

62 - As the temperature is increased, the coefficient of friction

A. Increases.

B. Reduces.

C. Remains unchanged.

D. Increase or decrease based on the lubrication regime.

Ans (D)

63 - Which of the following is a desirable property of boundary lubricant?

A. Dissolvability in lubricating oils.

B. Affinity to metallic surfaces.

C. Low shear strength and high melting point.

D. All of above.

Ans (D)

64 - The major disadvantage with extreme pressure lubricants is

A. Carcinogenic nature of the lubricant.

B. Low melting point.

C. It is ineffective.

D. All of above.

Ans (A)

65 - In hydrodynamic lubrication the major source of friction is

A. Shearing of lubricant film.

B. Abrasion due to asperities on tribo-surfaces.

C. Abrasion of tribo-surfaces due to free particles.

D. All of the above.

Ans (A)

66 - Which of the following statements is true about viscosity?

A. Dynamic viscosity is the ratio of shear stress to the resultant shear rate.

B. Kinematic viscosity is equal to dynamic viscosity divided by density.

C. The CGS unit of dynamic viscosity is Centipoise and CGS unit of kinematic viscosity is Centistokes.

D. All of above.

Ans (D)

67 - Film thickness in elastohydrodynamic lubrication depends on

A. Applied load and relative velocity.

B. Lubricant properties.

C. Properties of contacting materials.

D. All of above.

Ans (D)

68 - Viscosity of multigrade oils

A. Reduces with temperature but at higher sensitivity compare to monograde oil.

B. Increases with temperature but at higher sensitivity compare to monograde oil.

C. Reduces with temperature but at lower sensitivity compare to monograde oil.

D. Increases with temperature but at lower sensitivity compare to monograde oil.

Ans (C)

69 - Viscosity Index denotes

A. Relationship between the dynamic and kinematic viscosities.

B. Sensitivity of lubricants viscosity with respect to temperature.

C. Both (a) and (b).

D. There is no sliding and only rolling motion involved between cage and balls.

Ans (B)

70 - Which one is the common system for oil classification?

A. SAE (Society of Automobile Engineers).

B. API (American Petroleum Institute).

C. ISO (International Organization for Standardization).

D. All of the above.

Ans (D)

71 - Which of the following is not an advantage/benefit of solid lubricant?

A. More effective at high loads.

B. Resistance to deterioration.

C. Good heat dissipation.

D. Highly stable in extreme temperature and environment.

Ans (C)

72 - Out of the following which is NOT an example of solid lubricant?

A. Graphite lubricant.

B. Molybdenum Sulphite lubricant.

C. Polytetrafluoroethylene lubricant.

D. Multigrade lubricant.

Ans (D)

73 - Which of the following is/are the constituents of grease?

A. Base oil.

B. Additive.

C. Thickness fibre.

D. All of above.

Ans (D)

74 - Which of the following is NOT the advantage of grease?

A. Remains at application point and adhere to the surface.

B. Less frequent application needed.

C. Good for inclined/vertical shaft.

D. Good dissipation of heat.

Ans (D)

75 - Apart from reducing friction and wear, the secondary purpose(s) of lubricants is/are

A. Heat dissipation.

B. Reducing corrosion.

C. Both (a) & (b).

D. None of these.

Ans (C)

Model Question Paper

Subject : Tribology

Branch : Mechanical

Class : B. E.

Semester : VIII

1)	Asperities are basically A) Sharp tip on surface. B) Edge of a surface. C) Corner of a surface. D) Hole in a surface. Ans : A
2)	The Meaning of Greek word "Tribos" from which the word Tribolgy is formed is A) Rubbing B) Movement C) Fluid D) Heat Ans : A
3)	Which one of the following statement is true, A) Wear rate increases with increasing load. B) Wear rate decreases with increasing temperature. C) Wear rate decreases with increasing speed. D) Wear rate is independent of load/temperature. Ans : A
4)	The force of friction depends upon A) Nature of surface of contacts B) Material of objects in contact C) Both "A' and 'B' D) None of the Above Ans : C
5)	The ratio of limiting force of friction(F) to the normal reaction (R) is known as A) Coefficient of friction B) Force of friction C) Angle of friction D) None of the Above Ans : A
6)	Zero wear increases performance because A) It causes polishing of surface B) Size of surface asperities increase C) It removes lubrication from the surface D) It increases load bearing capacity of the surface Ans : A

7)	Which one of the following parameter is not included by StribackCurve ? A) Viscosity of the lubricant. B) Speed of the surfaces. C) Load at the interface. D) Surface roughness. Ans : D
8)	Which among the following is not an adhesive wear mechanism ? A) Galling B) Scoring C) scuffing D) Polishing Ans : D
9)	As per the Archard's wear equation , wear volume in adhesive wear is independent of A) Sliding distance of travel B) Load C) Hardness of soft Material D) Rolling Distance Ans : D
10)	Which of the following is not true about measurable wear? A) Measurable wear is undesirable. B) It can cause vibration of noise. C) Measurable wear may roughen the surfaces. D) It polishes the surfaces. Ans : D
11)	Scratching is form of A) Abrasive wear B) Adhesive wear C) Corrosive wear D) Fatigue wear Ans : A
12)	Erosive wear is a function of A) Particle velocity B) Impact angle C) Size of abrasive D) All of above Ans : D
13)	Wear rate is lesser in 3-body abrasion as compared to 2-body abrasion because-- A) Energy is consumed in rolling motion of free hard particles. B) Only spherical asperities are involved in 3-body abrasion. C) Size of the asperities is smaller in 3-body abrasion. D)Generally hardness of free particles is very low. Ans : A
14)	To minimizing sliding friction, shear strength of the lubricant compared to shear strength of the Tribo-surfaces should be: A) Higher B) Lower C) insignificant D) Equal Ans : C
15)	As the temperature is increased, coefficient of friction A) Increases. B) Reduces. C) Remains unchanged. D) Increases or decrease based on the lubrication regime. Ans : D
16)	The force of friction acts in a direction _____ to the direction on motion of object A) Same B) Opposite C) Perpendicular D) Downwards Ans : B

17)	In hydrodynamic lubrication the major source of friction is A) Shearing of lubrication film. B) Abrasion due to asperities on tribo-surfaces. C) Abrasion of tribo-surfaces due to free particles. D) All of the above Ans : A
18)	When the two surfaces in contact have a thick layer of lubrication I between them, it is known as A) Solid friction B) Rolling friction C) Greasy friction D) Film friction Ans : D
19)	Which of the following kinetic friction is smaller? A) Limiting friction B) Static friction C) Rolling friction D) Sliding friction Ans : C
20)	Friction can be increased by _____ A) Using air cushion B) lubricants C) using sand D) using ball bearings Ans : C
21)	The following is (are) the example(s) of Plain bearing(s). A) Linear Bearing B) Journal bearing C) Thrust Bearing D) All of the Above Ans : D
22)	In hydrostatic bearings , A) The oil film pressure is generated only by the rotation of the journal. B) The oil film is maintained by supplying oil under pressure. C) Do not require external supply of lubricant. D) Grease is used for lubrication. Ans : D
23)	On the basis of direction of load bearing can be classified as- A) Radial, thrust, conical. B) Radial, conical, hydrodynamic. C) Aerodynamic, hydrodynamic ,dry. D) Rolling, sliding, linear. Ans : A
24)	Babbitt is used A) Usually to make integral bearings B) To not to damage the journal bearing during direct contact C) To collect any containments in the lubrication D) All of the above Ans : D
25)	The factors that constitute energy loss in hydrostatic bearing are , A) Energy loss to pump the lubricating oil. B) Energy loss due to viscous friction. C) Both A) and B) . D) None of the these. Ans : C

26)	Hydrostatic bearing usually use ____ as lubricant A) Oil B) Grease C) Semi solid lubricant D) Any of the above Ans : A
27)	Hydrostatic bearing enters Hydrodynamic state when the journal is A) Stationary B) Rotating C) any of the above D) Both 'A' and 'B' Ans : B
28)	Which type of bearing(s) provides a bearing surface for forces acting along axis to the shaft? A) Thrust bearing. B) Journal bearing. C) Linear bearing. D) None of the above. Ans : A
29)	Which of the following is not a part of Hydrostatic lubrication system? A) Runner B) Pressure Gauge C) tank D) ball valve Ans : D
30)	where pad is located in hydrostatic bearing. A) Middle B) top C) bottom D) centre Ans : C
31)	Hydrostatic bearing usully use --- as lubricant. A) Oil B) Grease. C) Nothing. D) Any of the above. Ans : A
32)	The Hydrostatic bearing is not used in following application A) Ball mills B) Dental drills C) Accelerometers D) Gyroscope Ans : C
33)	Average velocity of lubricating fluid is. A) 2/3 of maximum velocity B) 1/3 of max velocity C) 1/2 of maximum velocity D) 3/4 of maximum velocity Ans : A
34) A	Hydrostatic bearing enters hydrodynamic state when the journal is A) Stationary. B) Rotatory. C) Both A) and B) D) None of the above. Ans : B

35)	Which of the following are SAE viscosity grades for engine oils? A) SAE 18 B) SAE 20 C) SAE 35 D) All of the above Ans : B
36)	Which of the following is not a physical property of lubricant. A) pour point B) cloud point C) Demulsibility D) Foaming Ans : C
37)	Which of the following is not a additives. A) Alcohol B) Fish oil C) Synthetic oil D) Amine Ans : C
38)	If the lubricating oil having density of 0.9gm/cc then what is the value of oil in kg/m3 A) 900 kg/m3 B) 90kg/m3 C) 9000kg/m3 D) 0.9 kg/m3 Ans : A
39)	Convert the flow rate of fluid 0.376092x106 mm3 /sec flowing through rectangular slot in lit/min A) 11.1155 lit per min B) 22.5655 lit per min C) 33.4656 lit per min D) 44.333 lit per min Ans : B
40)	An oil of relative density 0.8 has a viscosity of 0.4 Pascal-seconds at a given temperature. Convert it into CP A) 200CP B) 300CP C) 400CP D) 350CP Ans : C
41)	In the Petroff's equation the value of eccentricity / radial clearance (Eccentricity ratio(e)) is ranging from A) 0 to 0.2 B) 0 to 1 C) 0 to 0.5 D) None of the Above Ans : C
42)	The usual clearance provided in hydrodynamic bearing per mm of diameter of shaft is A) 0.01 micron B) 0.1 micron. C) 1 micron, D) 10 micron.s Ans : C

43)	A journal of 120 mm diameter rotates in a bearing at a speed of 1000 rpm. What is the power lost during friction if 8 kN radial load acts on the journal and coefficient of friction is 2.525×10^{-3}? A) 0.126 kW B) 0.253 KW C) 2.365 kW D) 7.615 Kw Ans : A
44)	A journal bearing is a ---contact bearing working on the hydrodynamic lubrication and which supports load in ----direction. A) Sliding, Axial. B) Rolling, Radial. C) Sliding, Radial. D) Rolling, Axial. Ans : A
45)	The following is (are) the example(s)of plain bearing(s). A) Thrust bearing . B) Linear bearing. C) Journal bearing. D) All of the above. Ans : D
46)	The lubrication in which load of bearing is carried solely by a film of fluid and there is no contact between the two bearings surface is called , A) Full film condition . B) Boundary film condition. C) Dry condition. D) None of the above. Ans : A
47)	In hydrodynamic bearings A) The oil film pressure is generated only by the rotation of the journal B) The oil film is maintained by supplying oil under pressure C) Do not require external supply of lubricant D) Grease is used for lubrication Ans : A
48)	The bearings of heavy series have capacity _____ over the medium series. A) 20 to 30% B) 10 to 20% C) 30 to 40% D) 40 to 50% Ans : A

49)	The usual clearance provided in hydrodynamic bearing per mm of diameter of shaft is A) 0.01 micron B) 0.1 micron C) 1 micron D) 10 microns Ans : C
50)	Oil in journal bearing should be applied at the point where load is A) Nil or lightest B) Maximum C) Average D) Any one of the above Ans : A
51)	The rated life of a bearing varies A) Directly as load B) Inversely as square of load C) Inversely as cube of load D) Inversely as fourth power of load Ans : C
52)	On the basis of direction of load bearing can be classified as A) Radial, thrust, conical. B) Radial, conical, hydrodynamic. C) Aerodynamic, hydrodynamic, dry. D) Rolling, sliding, linear. Ans : A
53)	Required material properties for the design of journal bearing are: A) Durable. B) Low friction. C) Low wear. D) All of the above. Ans : D
54)	In a hydrodynamic lubricated bearing , A) There is a thick film of lubricant between the journal and the bearing. B) There is a thin film of lubricant between the journal and the bearing. C) There is no lubricant between the journal and the bearing. D) The lubricant is forced between the journal and the bearing by external pressure. Ans : A
55)	What are very important factors for design of hydrodynamic bearing for given shaft diameter? A) Bearing clearance, length. B) Bearing length, bore diameter. C) Both (a) & (b). D) Bearing thickness Ans : A

56)	How many rolling elements are present inside a hydrodynamic bearing? A) 10 B) 12. C) 15. D) None of these Ans : D
57)	In what operating conditions grease is used to lubricate a journal bearing? A) Temperature involved is low. B) Low operating speed. C) Both (a) & (b). D) None of these. Ans : C
58)	Which of the following is true about full journal bearing? A) The angle of contact of bushing with the journal is 3600. B) The angle of contact of bushing with the journal is less than 1800. C) Full journal bearing can take load in any axial direction. D) Full journal bearing can take load in any radial direction. Ans : D
59)	Petroff's equation is used for A) Rough estimation of friction loss in sliding bearing. B) Change in viscosity wrt to temperature. C) Change in density wrt to temperature. D) Both (a) & (b) Ans : A
60)	In hydrodynamic lubrication minimum film thickness (hmin), a critical design criterion, is a function of : A) Relative velocity (U). B) Applied load (W). C) Viscosity. D) All of above. Ans : D

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Model Question Paper

Subject: **Tribology**
Branch : mechanical engg
Class : BE
Semester VIII

1) The meaning of the Greek word “Tribos” from which the word Tribology is formed is
A. Rubbing.
B. Movement.
C. Fluid.
D. Heat.
Ans A. Rubbing

2) The following is (are) the example(s) of static friction

A. Shoe brake applied to a vehicle
B. Shoe brake applied to a train
C. Dry grinding stone abrades the surface of metal
D. All of the above

Ans All of the above

3) The flash point of lubricant must be_____the working temperature.
a) well below
b)well above
c)equal to
d) None of the above
Ans well above

4) Specific gravity of lubricant can be measured by using
a)Hydrometer
b)Viscometer
c)Anemometer
d)Pyranometer
ANS a Hydrometer

5) the absolute viscosity of water at room temperature is

a) 1 cP
b) 2 cP
c) 3 cP
d) 4 cP

Ans 1 cP

6) _____of the lubricating oil is its ability to separate from water.

Viscosity
Foaming
Demulsibility
Oxidation stability
Ans Demulsibility

7) Synovial fluid is a lubricant that is found in
A. Human bone joints.
B. Gearboxes.
C. IC engines.
D. Rolling element bearings.

Ans Human bone joints

8) Which formula is used to calculate angle of static friction (Φs)?
a. tan-1 μs
b. sin-1 μs
c. cos-1 μs
d. none of the above

Ans . tan-1 μs

9) Frictional force depends on _____
a. surface area in contact
b. roughness of surface
c. both a. and b.
d. none of the above

Ans roughness of surface

10) _____cannot be used for determining the coefficient of friction

a) Inclined plane rig
b) Pin on disk rig
c) Pin on cylinder rig
d) Crossed cylinder Rig

Ans Inclined plane rig

11) which of the following theory said that there are certain attractive and repulsive forces existing between the molecule of contacting surfaces

a) Coulombs Theory of interlocking
b) Tomlinson theory of molecular attraction
c) Bowden and tabors theory
d) none of the above

Ans Tomlinson theory of molecular attraction

12) . The coefficient of static friction is _____
a) Less than the coefficient of kinetic friction
b) Greater than the coefficient of limiting friction
c) Equal to the coefficient of kinetic friction
d) Equal to the tangent of the angle of friction

Ans d) Equal to the tangent of the angle of friction

13) Which of the following kinetic friction is smaller?
a) Limiting friction
b) Static friction
c) Rolling friction
d) Sliding friction

14) _____is the friction experienced between two dry and unlubricated surfaces in contact.
a) Pivot friction
b) Solid friction
c) Boundary friction
d) None of the mentioned

Ans b) Solid friction

15) which of the following is type of minor wear
a)surface fatigue wear
b)fretting
c)adhesive wear
d)abrasive wear
ans fretting

16) Assumption in Archards equation for adhesive wear
a)the contacting surface have hemispherical asperities
b) the contacting surface have conical asperities
c) the contacting surface have upright cylindrical asperities
d) None of the mentioned

Ans the contacting surface have hemispherical asperities

17) The viscosity of petroleum oil for hydraulic lifts is _____
a) High
b) Low
c) Moderate
d) Very high

Ans b) Low

18) The properties of lubricants are
a) viscosity
b) flash point
c) fire point
d) all of the mentioned

Ans d) all of the mentioned

19) _____is the ability of the oil to resist internal deformation due to mechanical stresses.
a) Viscosity
b) Flash point
c) Fire point
d) None of the mentioned

Ans Viscosity

20) _____is the measure of density of oil.
a) Specific gravity
b) Film Strength
c) Adhesiveness
d) None of the mentioned

Ans Film Strength

21) What is the S.I unit of kinematic viscosity?
a. N-s / m2
b. m2 / s
c. N-s m2
d. None of the above

ans b. m2 / s

22) Which of the following parameters in Petroff's equation $f = 2\pi^2 (\mu ns/p) (r/c)$ is/are dimensionless?

a. r/c
b. μns/p
c. Both a. and b.
d. None of the above

ans c. Both a. and b.

23) Which of the following formula is used to calculate oil-film thickness in hydrodynamic bearings?
a. $h = (c + \epsilon \cos\theta)$
b. $h = (c - \epsilon \cos\theta)$
c. $h = c (1+ \epsilon \sin\theta)$
d. $h = c (1+ \epsilon \cos\theta)$

ans h = c (1+ Є cos θ)

24) In hydrodynamic bearings

a) The oil film pressure is generated only by the rotation of the journal

b) The oil film is maintained by supplying oil under pressure

c) Do not require external supply of lubricant

d) Grease is used for lubrication

Ans a) The oil film pressure is generated only by the rotation of the journal

25) Antifriction bearings are
a) Sleeve bearings

b) Hydrodynamic bearings

c) Thin lubricated bearings

d) None of the above

Ans None of the above

26) In hydrostatic bearings

a) The Oil film pressure is generated only by the rotation of the journal
b) The oil film is maintained by supplying oil under pressure
c) Do not require external supply of lubricant
d) Grease is used for lubrication
Ans The oil film is maintained by supplying oil under pressure

27) -Lubricant converts
a) Solid friction into liquid friction
b) Liquid friction into solid friction
c) both 'a' and 'b'
d) None of the above

Ans Solid friction into liquid friction

28) The following lubricants are obtained by fractional distillation of petroleum
a) Fatty oils
b) Solid lubricants
c) All of the above
d) Mineral oils
Ans Mineral oils

29) For low pressure and low speeds, we use
a)Mineral oils
b)Semi-solid lubricants
c)Solid lubricants
d)All of the above
Ans Solid lubricants

30) Which of the following is NOT a function of lubricant in IC engine?
A. Form a film to separate the surfaces.
B. Adhere to surface.
C. Withstand high temperature inside the cylinder.
D. Reduce the size of the asperities and improve the surface finish.
Ans . Reduce the size of the asperities and improve the surface finish.

31) The purpose of lubrication is
A. To reduce friction.
B. To reduce wear.
C. Transfer heat produced.
D. All of above.

Ans All of above.

32) As the temperature is increased, the coefficient of friction
A. Increases.
B. Reduces.
C. Remains unchanged.
D. Increase or decrease based on the lubrication regime.
Ans B. Reduces.

33) Viscosity Index denotes
A. Relationship between the dynamic and kinematic viscosities.
B. Sensitivity of lubricants viscosity with respect to temperature.
C. Both (a) and (b).
D. There is no sliding and only rolling motion involved between cage and balls.
Ans b Sensitivity of lubricants viscosity with respect to temperature.

34) Viscosity Index of the mineral oil can be improved by?
A. Removing aromatics components during refining stage.
B. Blending with high viscous index oils.
C. Using polymeric additives.
D. All of the above.
Ans Using polymeric additives.

35) Which one is the common system for oil classification?

A. SAE (Society of Automobile Engineers).
B. API (American Petroleum Institute).
C. ISO (International Organization for Standardization).
D. All of the above.

Ans SAE (Society of Automobile Engineers).

36) Out of the following which is NOT an example of solid lubricant?
A. Graphite lubricant.
B. Molybdenum Sulphite lubricant.
C. Polytetrafluoroethylene lubricant.
D. Multigrade lubricant.

Ans Multigrade lubricant

37) Which of the following is/are the constituents of grease?
A. Base oil.
B. Additive.
C. Thickness fibre.
D. All of above.

Ans All of above.

38) Phenomenon of stick-slip occurs because of
A. Large difference between static and kinetic coefficients of friction.
B. Additional force requirement to move the object.
C. Increase in hardness of surfaces.
D. Lubrication is applied on the surfaces.
Ans Large difference between static and kinetic coefficients of friction.

39) Cold weld between two surfaces happens because of
A. Excessive lubrication.
B. Adhesion between two surfaces.
C. Relatively high surface roughness.
D. Low temp on area of contact

Ans Adhesion between two surfaces.

40) Deformation of asperities causes
A. Increase in friction.
B. Decrease in friction.
C. Can increase or decrease friction.
D. No effect.
Ans Increase in friction

41) Which one of the following statement is true?
A. Wear rate increases with increasing load.
B. Wear rate decreases with increasing temperature.
C. Wear rate decreases with increasing speed.
D. Wear rate is independent of load/temperature.
Ans A. Wear rate increases with increasing load.

42) As per Archard's wear equation, wear volume in adhesive wear is independent of
A. Sliding distance of travel.
B. Load.
C. Hardness of the soft material.
D. Rolling distance.
Ans A. Sliding distance of travel.

43) _____friction is the force of friction experienced by a body when it is at rest.
a) Dynamic
b) Static
c) Sliding
d) Rolling
Ans b) Static

44) _____friction is the value of the limiting friction just before slipping occurs.
a) Dynamic
b) Static
c) Sliding
d) Rolling
Ans b) Static

45) _____friction is the force of friction experienced by a body when it is in motion.
a) Dynamic
b) Static
c) Sliding
d) Rolling

Ans a) Dynamic

46) When a body slides over another, the frictional force experienced by the body is known as_____friction.
a) sliding
b) rolling
c) static
d) none of the mentioned
ans a) sliding

47) Co-efficient of sliding friction for rubber on concrete is
a) 0.030
b) 0.70
c) 0.18
d) 0.004
Ans b) 0.70

48) Co-efficient of sliding friction for steel is
a) 0.030
b) 0.70
c) 0.18
d) 0.004
Ans c) 0.18

49) The co-efficient of dynamic friction is_____than static friction.
a) greater
b) equal to
c) lesser
d) none of the mentioned
Ans c) lesser

50) The viscosity is measured by
a) barometer
b) thermometer
c) viscosimeter
d) none of the mentioned
Ans c) viscosimeter

51) _____is the lowest temperature at which the oil burns continuously.
a) Viscosity
b) Flash point
c) Fire point
d) None of the mentioned
ans c) Fire point

52)most mineral oil have relative density in the range
a) 0.75 to 0.85
b) 0.85 to 0.95
c) 0.65 to 0.75
d) None of the mentioned
ans b) 0.85 to 0.95

53)specific heat is the amount of heat required to raise the temperature of one unit mass of lubricant through
a) 1 degree centigrade
b) 2 degree centigrade
c) 3 degree centigraded) 4 degree centigrade

ans a) 1 degree centigrade

54)which of following is not desirable property of lubricant
a) high VI
b) high flash point
c) low pour point
d) low specific heat
ans d) low specific heat

55)eccentricity is a distance between
a) oil film thickness and center of bearing
b) center of bearing and journal in operating condition
c) both a and b
d) none of above

56)which assumption is wrong in Reynolds equation
a) the lubricant obey Newtons law of viscosity
b) the flow of lubricant is laminar
c) the lubricant is incompressible.
d) none of above

57) In infinitely long journal bearings the length of journal bearing in axial direction is assume to be
a) finite
b) infinite
c)neglected
d) none of above
ans b) infinite

58) which of following is not bearing design variable
a) length to diameter ratio
b) unit bearing pressure
c) radial clearance
d) none of above
ans d) none of above

59)which of following is limitation of hydrostatic bearing
a) they have high positional accuracy
b) they have low friction loss
c)they have high initial as well as maintenance cost
d) none of above
ans c)they have high initial as well as maintenance cost

60) fluid erosion is a type of
a) major wear
b) minor wear
c) friction
d) lubrication.
Ans b) minor wear

Model Question Paper

Subject: Tribology

Branch: Mechanical Engineering

Class: BE

Semester: VIII

UNIT-I

Q1. The force of friction depends upon _____.

A Nature of surface of contact

B Material of objects in contact

C Both A and B

D None of the these

Ans.: C Both A and B

Q2. As per laws of dry friction, the frictional force _____.

A is independent of the sliding velocity

B is directly proportional to the load

C depends upon the nature of sliding surface

D All of these

Ans.: D All of these

Q3. Kinetic friction is_____than static friction

A Less

B Equal

C Greater

D None of the these

Ans.: ALess

Q4. Friction can be increased by _____

A Using air cushion

B Lubricants

C Using sand

D Using ball bearings

Ans.: C Using sand

Q5. Area of tribology_____

A Lubrication

B Friction control

C Wear prevention

D All of these

Ans.: D All of these

Q6. Adhesion and deformation both are responsible for friction

A True

B False

C Statement incomplete

D All of these

Ans.: A True

Q7. Solid Erosion is the type of Major Wear

A True

B False

C Statement incomplete

D All of these

Ans.: B False

Q8. Delamination theory of wear is given by_____

A Tomlinson

B Suh

C Archard

D Coulomb's

Ans.: B Suh

Q9. The volume of wear material is proportional to the load

A True

B False

C Statement incomplete

D All of these

Ans.: A True

Q10. Which factors affecting wear rate?

A Surface finish

B Load

C Temperature

D All of these

Ans.: D All of these

Q11. The body will move only when____

A Force of friction = applied force

B Force of friction < applied force

C Force of friction > applied force

D All of these

Ans.: B Force of friction < applied force

Q12. The force of friction (F) is equal to

A μR/2

B μR

C 2μR

D μR/3

Ans.: B μR

Q13. The friction is due to the interlocking of the asperities is explained by

A Tomlinson

B Coulomb's

C Both A and B

D None of these

Ans.: B Coulomb's

Q14. Which are the types of Major wear

AAdhesive Wear

B Abrasive Wear

C Corrosive Wear

D All of these

Ans.: D All of these

Q15. In which of the following "wear as desirable effect"

A Gears

B Grinding

C Bearings

D None of the these

Ans.: B Grinding

Q16. The friction is due to molecular attraction between the molecules is explained by

A Tomlinson

B Coulomb's

C None of these

D All of these

Ans.: C None of these

Q17. Static friction occurs during the motion

A False

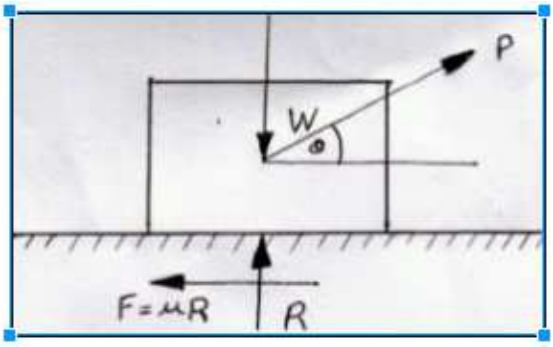
B True

C None of these

D All of these

Ans.: A False

Q18The value of Normal reaction (R) for the following figure is ____,
Where, W = Weight of block, P = Applied force, μ = Coefficient of friction, θ = Angle



A W – PSinθ

B W + PSinθ

C P – WSinθ

D P + WSinθ

Ans.: A W – PSinθ

Q19. When the two surfaces in contact have a very thin layer of lubricant in between them, it is known as____

A Solid friction

B Rolling friction

C Greasy friction

D Film friction

Ans.: D Film friction

Q20. Which one of the following is NOT the purpose of Tribology?

AImprove service life.

B Increase safety and reliability.

C Reduce fatigue.

D Increase heat generation

Ans.: D Increase heat generation

UNIT-II

Q21 Which of the following is not a part of Hydrostatic lubrication system?

A. Runner
B. pressure gauge
C. tank
D. ball valve

Ans.: D ball valve

Q22 where pad is located in hydrostatic bearing

A. middle
B. top
C. bottom
D. centre

Ans.: Cbottom

Q23 How you will calculate optimum film thickness in hydrostatic bearing

A. Graphically
B. integrate to power loss
C. adding frictional and pumping power loss
D. Differentiating power loss

Ans.:D Differentiating power loss

Q24 where semi cone angle of Hydrostatic bearing journal is located?

A. at center
B. at top
C. at bottom
D. at left side

Ans.:C at bottom

Q25 which type of bearing(s) provides a bearing surface for forces acting along axis to the shaft?

A. Thrust bearing
B. Journal bearing

C. guide bearing
D. None of the above

Ans.:A Thrust bearing

Q26 The Hydrostatic bearing is not used in following application

A. Ball mills
B. dental drill
C. accelerometers
D. gyroscope

Ans.:C accelerometers

Q27 Average velocity of lubricating fluid is

A. 2/3 of maximum velocity
B. 1/3 of max velocity
C. 1/2 of maximum velocity
D. 3/4 of maximum velocity

Ans.:A 2/3 of maximum velocity

Q28 Which of the following is power loss in bearing

A. Frictional power loss
B. pumping power loss
C. power lost in churning
D. all of the above

Ans.:D 2/3 of maximum velocity

Q29 Which of the following lubricant is not the type of solid lubricant

A. Molybdenum disulfide (MoS2)
B. Hexagonal boron silicate
C. Tungsten disulfide
D. Hexagonal boron nitride

Ans.:B Hexagonal boron silicate

Q30 Which of the followig are SAE viscosity grades for engine oils?

A. SAE 18
B. SAE 20

C. SAE 35
D. All of the above
Ans.:B SAE 20

Q31 Which of the following is not a physical property of lubricant.

A. pour point
B. cloud point
C. Demulsibility
D. foaming
Ans.:C Demulsibility

Q32 Hydrostatic lubrication comes under……

A. Thin film
B. Squeeze film
C. Thick film
D. Boundry film
Ans.:C Thick film

Q33 Which of the following is not a additives

A. Alcohol
B. Fish oil
C. Synthetic oil
D. Amine
Ans.:C Synthetic oil

Q34 Hydrostatic bearing used for

A. Medium loads
B. Heavy loads
C. low loads
D. light loads
Ans.:BHeavy loads

Q35 Hydrostatic bearing works on which of the following fundamental equation?

A. Reynold equation

B. petroffs equation
C. viscous flow through slot
D. Continuity equation

Ans.: C viscous flow through slot

Q36 An oil of relative density 0.8 has a viscosity of 0.4 Pascal-seconds at a given temperature. Convert it into CP

A. 200CP
B. 300 CP
C. 400 CP
D. 350 CP

Ans.: C 400 CP

Q37 Convert the flow rate of fluid 0.376092x106 mm3 /sec flowing through rectangular slot in lit/min

A. a.11.1155 lit per min
B. b. 22.5655 lit per min
C. c. 33.4656 lit per min
D. d.44.333 lit per min

Ans.: B 22.5655 lit per min

Q38 Calculate fow rate of luricant in hydrostatic baring if supply pressure = 6Mpa, fluid film thickness = 0.15mm,absolute viscosity 31.25x10-9 N-s/mm2 ,having outer and inner radius 205.77mm and 123.46mm respectively.

A. 39.84 lit/min
B. 29.48 lit/min
C. 19.33 lit/min
D. 22.36 lit/min

Ans.: A 39.84 lit/min

Q39 If the lubricating oil having density of 0.9gm/cc then what is the value of oil in kg/m3

A. 900 kg/m3
B. 90kg/m3
C. 9000kg/m3

D. 0.9 kg/m3

Ans.: A 900 kg/m3

Q40 Calculate the load carrying capacity of Hydrostatic bearing having inlet pressure 5.5 bar and outer and inner radius 50mm and 30mm respectively.

A. 2777.135 N
B. 2785.05 N
C. 2763.03 N
D. 2706.01 N

Ans.: D 2706.01 N

UNIT-III

Q41. Hydrodynamic lubrication used in?

A Motor vehicles

B Locomotives.

C Machine tools.

D All of these

Ans.: D All of these

Q42. Boundary lubrication is also known as

A Thick-film lubrication

B Thin-film lubrication

C None of these.

D All of these

Ans.: B Thin-film lubrication

Q43. Which assumption is considered in Reynold's equation?

A Fluid must be Newtonian

B flow should be viscous and laminar

C Fluid must be incompressible

D All of these

Ans.: D All of these

Q44. Navier-Strokes equation can be used for finding Reynold's equation?

A Yes

B No

C Data incomplete

D None of these

Ans.: A Yes

Q45. The distance between the centres of bearing and the journal measured along the line of centres is known as…..

A Radial clearance

B Eccentricity

C Both A & B

D None of these

Ans.: B Eccentricity

Q46. The ratio ho/C is known as……

AEccentricity ratio

B Minimum oil film thickness ratio

C Both A & B

D None of these

Ans.: B Minimum oil film thickness ratio

Q47. If the length to diameter ratio is less than or equal to 0.5 then bearing is called as…….

AInfinitely short journal bearing

B Infinitely long journal bearing

C Incomplete definition.

D Noneof these

Ans.: A Infinitely short journal bearing

Q48. Which variables are used in design of Hydrodynamic lubrication?

A Design variables

B Performance variables

C Both A & B.

D None of these

Ans.: C Both A & B.

Q-49. Which of the following is not design variables?

A Viscosity

B Unit bearing pressure

C Journal Speed

D Temperature rise

Ans.: D Temperature rise

Q-50. Which of the following is performance variables?

A Viscosity

B Unit bearing pressure

C Journal Speed

D Temperature rise

Ans.: D Temperature rise

Q51. What is the power lost during friction if a journal of 120 mm diameter rotates in a bearing at a speed of 1000 rpm. Radial load acts on the journal IS 8 kN and coefficient of friction is 2.525 x 10^{-3}?

A. 0.126 kW
B. 0.253 KW
C. 2.365 kW
D. 7.615 Kw

Ans.: A0.126 kW

Q52.Lubricating oil of mass density 800 kg/m3 used in 360o hydrodynamic bearing has a flow rate of 6000 mm3. Neglecting side leakage if temperature rises to 10 oC and specific heat is 1.55 kJ/kg oC, what is the rate of heat dissipated in the bearing?

A. 7.4 W
B. 236 W
C. 0.236 kW
D. 0.0744 Kw

Ans.: D 0.0744 Kw

Q53.Which of the following formula is used to calculate oil-film thickness in hydrodynamic bearings?

A. $h = (c + \epsilon \cos \theta)$
B. $h = (c - \epsilon \cos \theta)$
C. $h = c (1+ \epsilon \sin \theta)$
D. $h = c (1+ \epsilon \cos \theta)$

Ans.: D $h = c (1+ \epsilon \cos \theta)$

Q54.Determine the Sommerfeld number considering the following data for hydrodynamic bearing?

1. Diameter of bearing = 120 mm

2. Bearing pressure = 5 N/mm2

3. Oil viscosity = 30 cP

4. Journal speed = 900 rpm

5. Radial clearance = 150 microns

A. 0.2360
B. 0.0144
C. 0.0115
D. 0.0178
Ans.: B 0.0144

Q55.In hydrodynamic bearings….

A The oil film pressure is generated only by the rotation of the journal

B The oil film is maintained by supplying oil under pressure

C Do not require external supply of lubricant

D Grease is used for lubrication

Ans.: A The oil film pressure is generated only by the rotation of the journal

Q56.If p = bearing pressure on projected bearing area, z = absolute viscosity of lubricant, and N = speed of journal, then the bearing characteristic number is given by

A ZN/p

B p/ZN

C Z/pN

D N/Zp

Ans.: A ZN/p

Q57.Oil in journal bearing should be applied at the point where load is..

A Nil or lightest

B Maximum

C Average

D Any one of the above

Ans.: A ZN/p

Q58.Which of the following parameters in Petroff's equation f = 2π2 (μns/p) (r/c) is/are dimensionless?

A. r/c
B. μns/p
C. Both A and B.
D. None of the above

Ans.: C Both A and B.

Q59.In Raimondi Boyd method which which variables are combined.

A. Dimensionless variable
B. Design and Bearing Variable
C. Design and Performance Variable
D. Performance Variable

Ans.:C Design and Performance Variable

Q-60. Exact analytical solution to Reynold equation obtained from

A. Dimensionless variable
B. Dimensionless Parameter
C. Long Journal Bearing
D. Long and short Journal Bearing

Ans.:DLong and short Journal Bearing

Model Question Paper

Name of Branch = Mechanical Engineering

Subject = Tribology **Class = BE**

Semester = VIII

Sr No	Unit -1 Intoduction to Tribology and Friction and Wear	Ans
1.	Areas of tribology are A) Lubrication B) Friction Control C) Wear prevention D) All of the above	D
2.	Tribological problems in industries are A) Loss of Material B) Risk of human life C) Both 1 and 2 D) None of the above	C
3.	For low pressure and low speeds, we used A) Mineral oils B) Solid lubricants C) Semi-solid lubricants D) All of the above	B
4.	The flash point of lubricant must be---------- the working temperature. A) Well below B) Well above C) Equal to D) None of the above	B
5.	Methods of reducing tribological problems in design is A) Adequete surface finish B) Adequete lubrication C) Surface treatment D) All of the above	D
6.	A ---------- is a mechanical element which locates two machine parts relative to each other and permits a relative motion between them. 1. Shaft 2. Bearing 3. Journal 4. Lubricant	B
7.	Which parameter compared by sliding and rolling contact bearing A) Speed, life B) Magnitude of load C) Both A and B D) All of the above	A

8.	The term ---------- is used to indicate the variation of viscocity with temperature 1. Viscocity index 2. Foaming 3. Viscocity graph 4. Viscocity	A
9.	Kinds of friction are A) Dry Friction B) Boundry Friction C) Mixed Friction D) All of the Above	D
10.	A ---------- is defined as a process of removal of material from one or both of two solid surfaces in solid-state contact. A) Friction B) Wear C) Stick-slip phenomenon D) None of the Above	B
11.	Which factors affecting the wear A) Surface Films B) Crystal Structure C) Both A and B D) None of the Above	C
12.	A sliding phenomenon of one body over another body occurs under a steady pulling force, If the friction force or sliding velocities varies, as a function of distance or a time and produces a form of oscillation, it is called as ---------- A) Stick-slip Phenomenon B) Amontons Mechanical Interlocking Theory C) Friction D) None of the Above	A
13.	Which liquid lubricant are produced by vegetable and animals oils A) Mineral oils B) Mineral oil with Addetives C) Natural oils D) Synthetic oils	C
14.	Specific gravity of lubricant can be measured by using A) Hydrometer B) Anemometer C) Viscometer D) Pyranometer	B
15.	The influencing factors ofof selection of lubricants are A) Temperature and Geometry B) Speed and Load C) Both A and B D) None of the Above	A
16.	A ------- has been defined as the science and practices of interacting surces in relative motion and the practices related there to.	D

	A) Lubrication B) Friction C) Wear D) None of the Above	
17.	A rectangular plate of 250mm width and 500mm length is placed over a plane stationary surface. The two surfaces are separated by an oil film of thickness 0.15mm. The viscocity of oil is 40.5cP. Determine the force required to pull the plate at a speed of 1.5 m/s. A) 25.625 N B) 50.625 N C) 15.781 N D) 31.234 N	B
18.	Laws of friction are A) Apparent area or Nominal area of contact B) Contour Area of contact C) Both A and B D) None of the Above	C
19.	Theory of Adhesive wear is also known as A) Archards Wear Theory B) Rowes Modified Adhesion Theory C) Rabinowicz Quantitative Theory D) None of the Above	A
20.	Theories of Friction are A) Simple Adhesion Theory of Friction B) Modified Adhesion Theory of Friction C) Abrasive Theory of Friction D) All of the Above	D

Sr No	Unit -2 Lubrication and Hydrostatic Bearing	Ans
1.	In hydrostatic bearing A) The oil film pressure is generated only by the rotation of the journal B) The oil film is maintained by supplying oil under pressure C) D not require external supply of lubricant D) Greases is used for lubrication	B
2.	Hydrostatic bearing usually use ---------- as lubricant. A) Oil B) Grease C) None of the Above D) Any one of the Above	A
3.	Hydrostatic bearing enters hydrodynamic state when the journal is A) Stationary B) Rotating C) Both A and B D) None of the Above	B
4.	The location of the journal is measured by	A

	A) Attitude Angle B) Pressure Angle C) Wedge Angle D) None of the Above	
5.	In hydrostatic bearing the ratio change in load (W) to the change of bearing clearance (ho) is called ----------. A) Bearing Pressure B) Clearance Ratio C) Bearing Stiffness D) None of the above	C
6.	Applications of hydrostatic bearings are A) Gyroscopes B) Rolling Mills C) Ultracentrifuges D) All of the Above	D
7.	The attitude angle and eccentricity ratio are dependent on the A) Direction B) Speed of Rotation C) Load D) All of the Above	D
8.	A self excited vibration of the journal is called ---------. A) Oil Whirl B) Shaft Whirl C) Journal Whirl D) Bearing Whirl	A
9.	Modes of lubrication are A) Thick Film Lubrication B) Thin Film Lubrication C) Both A and B D) None of the Above	C
10.	Vertical turbo generators, Centrifuges, Ball mills are the examples of A) Hydrodynamic Lubrication B) Hydrostatic Lubrication C) Elasto-hydrodynamic Lubrication D) None of the Above	B
11.	In a hydrostatic bearing the thickness of the slot or the thickness of the fluid film is denoted by A) h B) t C) l D) b	A
12.	The arrangement of hydrostatic lubrication system are A) Lubrication at constant pressure B) Lubrication at constant flow C) Both A and B D) None of the Above	C

13.	Power losses in hydrostatic step bearing are A) Frictional Power Losses B) Pumping Power Losses C) Both A and B D) None of the Above	C
14.	Optimum design of hydrostatic step bearing are A) Minimizing total power loss B) Minimizing fluid flow rate C) Minimizing inlet pressure D) All of the above	D
15.	Determine the mass flow rate of fluid through the slot where two reservoirs are connected bu a slot having size 300 mm x 200 mm x 0.3 mm. The reservoirs are filled with an oil of viscocity 105 cP and the pressures in the two resrevoirs are 10 bar and 3 bar respectively and the relative density of oil is 0.8. A) $m = 5 \times 10^{-3}$kg/s B) $m = 8 \times 10^{-3}$kg/s C) $m = 6 \times 10^{-3}$kg/s D) $m = 10 \times 10^{-3}$kg/s	B
16.	Re-refining, Reconditioning, Reprocessing are are the uses of A) Recycled motor oil B) Natural oil C) Vegetable oil D) All of the Above	A
17.	Types of sliding contact bearings are A) Hydrodynamic bearing B) Hydrostatic bearing C) Rolling bearing D) Only A and B	D
18.	A rectangular plate of 250 mm width and 500 mm length is placed over a plane stationary surfaces. The two surfaces are separated by an oil film of thickness 0.15 mm. The viscocity of oil is 40.5 cP. Determine the force required to pull the plate at a speed of 1.5 m/s. A) F = 50.625 N B) F = 40.12 N C) F = 15.625 N D) None of the above	A
19.	Comparison parameters of sliding and rolling contact bearings are A) Speed and Life B) Magnitude of load C) Noise and Cost D) All of the Above	D
20.	If the shaft terminates at a bearing surface then it is called as ------- bearing. A) Pivot B) Thrust C) Both A and B D) Collar	A

Sr No	Unit -3 Hydrodynamic Journal Bearing	Ans
1.	It is the distance between the centers of bearing and journal in operating condition is known as -------. A) Ecentricity B) Radial Clearance C) Ecentricity Ratio D) None of the Above	A
2.	In the pettroffs equation the value of Ecentricity / Radial clearance (Ecectricity Ratio (e)) is ranging from --------. A) 0 to 0.2 B) 0 to 1 C) 0 to 0.5 D) None of the Above	C
3.	Which of the following is not a property of lubricant? A) High Specific Heat B) High Flash Point C) Low Pour Point D) Low Oxidation Stability	D
4.	What is the shear stress in fluid per unit velocity gradient is called as -------. A) AbsouluteViscocity B) Dynamic Viscocity C) Both A and B D) None of the Above	C
5.	Which of the following Parameters in patroff's equation $f=2\#^2$ ((Mns/P) / (R/c)) are dimessionless A) R/c B) Mns/P C) Both A and B D) None of the Above	C
6.	Which of the following formula is used to calculate oil film thickness in hydrodynamic bearing. A) h = (C + EcosQ) B) h = (C – Ecos Q) C) h = C (1+EsinQ) D) h = C (1+EcosQ)	D
7.	Lubricating oil used in hydrodynamic bearing total flow rate of 0.340 lit/min & side leakage of 0.1520 lit/min . If mass density of oil is 600 kg/m3& specific heat is 1.05 KJ/Kg℃ .what is the rise in temperature if power lost in friction is 0.05 KW A) 18.03°C B) 11.22°C C) 22.23°C D) 15.11°C	A

8.	Determine the Sommerfeld number considering the following data for hydrodynamic bearing 1. Diameter of bearing =120mm 2. Bearing Pressure = 5 N/mm^2 3. Oil Viscosity = 30 CP 4. Journal Speed = 900rpm 5. Radial Clearance = 150 Microns A) 0.2360 B) 0.0115 C) 0.0144 D) 0.0178	B
9.	In bearing oil film thickness 15 micron means ----- A) 0.00015 mm B) 0.0015 mm C) 0.015 mm D) None of the Above	B
10.	Design Considerations in Finite length hydrodynamic journal bearing are ------. A) Design Variables B) Performance Variables C) Both A and B D) None of the Above	C
11.	Performance variables are -------. A) Coefficient of Friction B) Temperature Rise C) Flow Rate of Lubricant D) All of the Above	D
12.	Lubricating oil of mass density 800 kg/m3 used in 360° hydrodynamic bearing has a flow rate of 600 mm^3. Neglecting side leakage if temperature rise to 10℃& specific heat is 1.55 KJ/Kg℃ . What is the rate of heat dissipated in the bearing ? A) 0.0744 KW B) 0.236 KW C) 7.4 W D) 236 W	A
13.	Regimes of hydrodynamic lubrication are ------ A) Boundary Lubrication or Thin film lubrication B) Hydrodynamic lubrication or Thick film lubrication C) Both A and B D) None of the Above	C
14.	APettroff's Sleeve bearing consists of a sleeve having a bore diameter of 100.1mm & a length of 100 mm. A shaft having 100 mm diaSupports a load of 4000N . A shaft runs at 2880 rpm in the sleeve if the frictional torque on the shaft is 10 N.m. What is the power lost in bearing ? A) 3.016 KW	A

	B) 2.016 KW C) 2.95 KW D) 1.150 KW	
15.	The lower limit on the minimum oil film thickness is give by ------ A) h_o =(0.0001 to 0.0002) r B) h_o= (0.0002 to 0.0003) r C) h_o= (0.0003 to 0.0004) r D) None of the Above	B
16.	Babbitt is used -------- A) Usually to make integral bearing B) Do not to damage the journal bearing during direct contact C) Both A and B D) None of the Above	C
17.	The lubrication in which load of bearing is carried partly by a film or fluid & partly by direct surfaces contact is called --------. A) Full Film Condition B) Boundry Condition C) Dry Condition D) None of the Above	B
18.	Which type of bearing provides a bearing surface for forces cutting along the axis to the shaft ? A) Thrust Bearing B) Journal Bearing C) Linear Bearing D) All of the Above	A
19.	The sommerfeld number or bearing characteristic number is give by ------ A) $S = [r/c]^2$ B) $S = [r/c]^2 mns$ C) $S = [r/c]^2 mns/P$ D) None of the Above	C
20.	The type of bearing used in crankshaft is A) Magnetic Bearing B) Plain Bearing C) Ball Bearing D) Roller Bearing	B

Subject : Tribology

Branch : Mechanical

Class : B. E.

Semester : VIII

1)	Asperities are basically A) Sharp tip on surface. B) Edge of a surface. C) Corner of a surface. D) Hole in a surface. Ans : A
2)	The Meaning of Greek word "Tribos" from which the word Tribolgy is formed is A) Rubbing B) Movement C) Fluid D) Heat Ans : A
3)	Which one of the following statement is true, A) Wear rate increases with increasing load. B) Wear rate decreases with increasing temperature. C) Wear rate decreases with increasing speed. D) Wear rate is independent of load/temperature. Ans : A
4)	The force of friction depends upon A) Nature of surface of contacts B) Material of objects in contact C) Both "A' and 'B' D) None of the Above Ans : C
5)	The ratio of limiting force of friction(F) to the normal reaction (R) is known as A) Coefficient of friction B) Force of friction C) Angle of friction D) None of the Above Ans : A
6)	Zero wear increases performance because A) It causes polishing of surface B) Size of surface asperities increase C) It removes lubrication from the surface D) It increases load bearing capacity of the surface Ans : A
7)	Which one of the following parameter is not included by StribackCurve ? A) Viscosity of the lubricant. B) Speed of the surfaces. C) Load at the interface. D) Surface roughness. Ans : D

8)	Which among the following is not an adhesive wear mechanism ? A) Galling B) Scoring C) scuffing D) Polishing Ans : D
9)	As per the Archard's wear equation , wear volume in adhesive wear is independent of A) Sliding distance of travel B) Load C) Hardness of soft Material D) Rolling Distance Ans : D
10)	Which of the following is not true about measurable wear? A) Measurable wear is undesirable. B) It can cause vibration of noise. C) Measurable wear may roughen the surfaces. D) It polishes the surfaces. Ans : D
11)	Scratching is form of A) Abrasive wear B) Adhesive wear C) Corrosive wear D) Fatigue wear Ans : A
12)	Erosive wear is a function of A) Particle velocity B) Impact angle C) Size of abrasive D) All of above Ans : D
13)	Wear rate is lesser in 3-body abrasion as compared to 2-body abrasion because-- A) Energy is consumed in rolling motion of free hard particles. B) Only spherical asperities are involved in 3-body abrasion. C) Size of the asperities is smaller in 3-body abrasion. D)Generally hardness of free particles is very low. Ans : A
14)	To minimizing sliding friction, shear strength of the lubricant compared to shear strength of the Tribo-surfaces should be: A) Higher B) Lower C) insignificant D) Equal Ans : C
15)	As the temperature is increased, coefficient of friction A) Increases. B) Reduces. C) Remains unchanged. D) Increases or decrease based on the lubrication regime. Ans : D
16)	The force of friction acts in a direction _____ to the direction on motion of object A) Same B) Opposite C) Perpendicular D) Downwards Ans : B
17)	In hydrodynamic lubrication the major source of friction is A) Shearing of lubrication film. B) Abrasion due to asperities on tribo-surfaces. C) Abrasion of tribo-surfaces due to free particles. D) All of the above Ans : A

18)	When the two surfaces in contact have a thick layer of lubrication I between them, it is known as A) Solid friction B) Rolling friction C) Greasy friction D) Film friction Ans : D
19)	Which of the following kinetic friction is smaller? A) Limiting friction B) Static friction C) Rolling friction D) Sliding friction Ans : C
20)	Friction can be increased by _____ A) Using air cushion B) lubricants C) using sand D) using ball bearings Ans : C
21)	The following is (are) the example(s) of Plain bearing(s). A) Linear Bearing B) Journal bearing C) Thrust Bearing D) All of the Above Ans : D
22)	In hydrostatic bearings , A) The oil film pressure is generated only by the rotation of the journal. B) The oil film is maintained by supplying oil under pressure. C) Do not require external supply of lubricant. D) Grease is used for lubrication. Ans : D
23)	On the basis of direction of load bearing can be classified as- A) Radial, thrust, conical. B) Radial, conical, hydrodynamic. C) Aerodynamic, hydrodynamic ,dry. D) Rolling, sliding, linear. Ans : A
24)	Babbitt is used A) Usually to make integral bearings B) To not to damage the journal bearing during direct contact C) To collect any containments in the lubrication D) All of the above Ans : D
25)	The factors that constitute energy loss in hydrostatic bearing are , A) Energy loss to pump the lubricating oil. B) Energy loss due to viscous friction. C) Both A) and B) . D) None of the these. Ans : C
26)	Hydrostatic bearing usually use ____ as lubricant A) Oil B) Grease C) Semi solid lubricant D) Any of the above Ans : A

27)	Hydrostatic bearing enters Hydrodynamic state when the journal is A) Stationary B) Rotating C) any of the above D) Both 'A' and 'B' Ans : B
28)	Which type of bearing(s) provides a bearing surface for forces acting along axis to the shaft? A) Thrust bearing. B) Journal bearing. C) Linear bearing. D) None of the above. Ans : A
29)	Which of the following is not a part of Hydrostatic lubrication system? A) Runner B) Pressure Gauge C) tank D) ball valve Ans : D
30)	where pad is located in hydrostatic bearing. A) Middle B) top C) bottom D) centre Ans : C
31)	Hydrostatic bearing usully use --- as lubricant. A) Oil B) Grease. C) Nothing. D) Any of the above. Ans : A
32)	The Hydrostatic bearing is not used in following application A) Ball mills B) Dental drills C) Accelerometers D) Gyroscope Ans : C
33)	Average velocity of lubricating fluid is. A) 2/3 of maximum velocity B) 1/3 of max velocity C) 1/2 of maximum velocity D) 3/4 of maximum velocity Ans : A
34) A	Hydrostatic bearing enters hydrodynamic state when the journal is A) Stationary. B) Rotatory. C) Both A) and B) D) None of the above. Ans : B
35)	Which of the following are SAE viscosity grades for engine oils? A) SAE 18 B) SAE 20 C) SAE 35 D) All of the above Ans : B

36)	Which of the following is not a physical property of lubricant. A) pour point B) cloud point C) Demulsibility D) Foaming Ans : C
37)	Which of the following is not a additives. A) Alcohol B) Fish oil C) Synthetic oil D) Amine Ans : C
38)	If the lubricating oil having density of 0.9gm/cc then what is the value of oil in kg/m3 A) 900 kg/m3 B) 90kg/m3 C) 9000kg/m3 D) 0.9 kg/m3 Ans : A
39)	Convert the flow rate of fluid 0.376092x106 mm3 /sec flowing through rectangular slot in lit/min A) 11.1155 lit per min B) 22.5655 lit per min C) 33.4656 lit per min D) 44.333 lit per min Ans : B
40)	An oil of relative density 0.8 has a viscosity of 0.4 Pascal-seconds at a given temperature. Convert it into CP A) 200CP B) 300CP C) 400CP D) 350CP Ans : C
41)	In the Petroff's equation the value of eccentricity / radial clearance (Eccentricity ratio(e)) is ranging from A) 0 to 0.2 B) 0 to 1 C) 0 to 0.5 D) None of the Above Ans : C
42)	The usual clearance provided in hydrodynamic bearing per mm of diameter of shaft is A) 0.01 micron B) 0.1 micron. C) 1 micron, D) 10 micron.s Ans : C

43)	A journal of 120 mm diameter rotates in a bearing at a speed of 1000 rpm. What is the power lost during friction if 8 kN radial load acts on the journal and coefficient of friction is 2.525×10^{-3}? A) 0.126 kW B) 0.253 KW C) 2.365 kW D) 7.615 Kw Ans : A
44)	A journal bearing is a ---contact bearing working on the hydrodynamic lubrication and which supports load in ----direction. A) Sliding, Axial. B) Rolling, Radial. C) Sliding, Radial. D) Rolling, Axial. Ans : A
45)	The following is (are) the example(s)of plain bearing(s). A) Thrust bearing . B) Linear bearing. C) Journal bearing. D) All of the above. Ans : D
46)	The lubrication in which load of bearing is carried solely by a film of fluid and there is no contact between the two bearings surface is called , A) Full film condition . B) Boundary film condition. C) Dry condition. D) None of the above. Ans : A
47)	In hydrodynamic bearings A) The oil film pressure is generated only by the rotation of the journal B) The oil film is maintained by supplying oil under pressure C) Do not require external supply of lubricant D) Grease is used for lubrication Ans : A
48)	The bearings of heavy series have capacity _____ over the medium series. A) 20 to 30% B) 10 to 20% C) 30 to 40% D) 40 to 50% Ans : A

49)	The usual clearance provided in hydrodynamic bearing per mm of diameter of shaft is A) 0.01 micron B) 0.1 micron C) 1 micron D) 10 microns Ans : C
50)	Oil in journal bearing should be applied at the point where load is A) Nil or lightest B) Maximum C) Average D) Any one of the above Ans : A
51)	The rated life of a bearing varies A) Directly as load B) Inversely as square of load C) Inversely as cube of load D) Inversely as fourth power of load Ans : C
52)	On the basis of direction of load bearing can be classified as A) Radial, thrust, conical. B) Radial, conical, hydrodynamic. C) Aerodynamic, hydrodynamic, dry. D) Rolling, sliding, linear. Ans : A
53)	Required material properties for the design of journal bearing are: A) Durable. B) Low friction. C) Low wear. D) All of the above. Ans : D
54)	In a hydrodynamic lubricated bearing , A) There is a thick film of lubricant between the journal and the bearing. B) There is a thin film of lubricant between the journal and the bearing. C) There is no lubricant between the journal and the bearing. D) The lubricant is forced between the journal and the bearing by external pressure. Ans : A
55)	What are very important factors for design of hydrodynamic bearing for given shaft diameter? A) Bearing clearance, length. B) Bearing length, bore diameter. C) Both (a) & (b). D) Bearing thickness Ans : A

56)	How many rolling elements are present inside a hydrodynamic bearing? A) 10 B) 12. C) 15. D) None of these Ans : D
57)	In what operating conditions grease is used to lubricate a journal bearing? A) Temperature involved is low. B) Low operating speed. C) Both (a) & (b). D) None of these. Ans : C
58)	Which of the following is true about full journal bearing? A) The angle of contact of bushing with the journal is 3600. B) The angle of contact of bushing with the journal is less than 1800. C) Full journal bearing can take load in any axial direction. D) Full journal bearing can take load in any radial direction. Ans : D
59)	Petroff's equation is used for A) Rough estimation of friction loss in sliding bearing. B) Change in viscosity wrt to temperature. C) Change in density wrt to temperature. D) Both (a) & (b) Ans : A
60)	In hydrodynamic lubrication minimum film thickness (hmin), a critical design criterion, is a function of : A) Relative velocity (U). B) Applied load (W). C) Viscosity. D) All of above. Ans : D

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