

Total No. of printed pages = 4

ME 181605

Roll No. of candidate

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2022

B.Tech. 6th Semester End-Term Examination

HEAT TRANSFER – II

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)

(i) Assertion (A): For the similar conditions the values of convection heat transfer coefficients are more in forced convection than in free convection.

Reason (R): In case of forced convection system the movement of fluid is by means of external agency.

(a) (A) and (R) are true and (R) is correct explanation of (A)

(b) (A) and (R) true but (R) is not correct explanation of (A)

(c) (A) is true but (R) is false

(d) (A) is false but (R) is true

(ii) For a flow over a flat plate, flow will be Laminar flow if the Reynolds No is less than or equal to _____.

(iii) For calculation of heat transfer by natural convection from a horizontal cylinder, what is the characteristic length in Grash of Number?

(a) Length of the cylinder

(b) Circumference of the base of the cylinder

(c) Diameter of the cylinder

(d) Half the circumference of the base of the cylinder

[Turn over

- (iv) In a counter flow heat exchanger, If the entry and exit temperature of hot fluid are 90°C and 50°C and that of cold fluid is 20°C and 40°C. Determine LMTD in Kelvin _____
- (v) Fouling factor of heat exchanger
- Increase thermal resistance
 - Decrease thermal resistance
 - Doesn't change thermal resistance
 - None of the above
- (vi) Water flow rate can be measured using a
- Thermocouple
 - Venturimeter
 - Pyrometer
 - All of the above
- (vii) In a shell and tube heat exchanger, baffles are provided on the shell side to
- Improve heat transfer
 - Provide support for tubes
 - Prevent stagnation of shell side fluid
 - All of these
- (viii) Write expression for effectiveness of heat exchanger for a Condenser in terms of NTU.
- (ix) For complete similarity between model and prototype, It is essential to have
- geometric similarity
 - dynamic similarity
 - both (a) and (b)
 - None of the above
- (x) Drop wise condensation usually occurs on
- Glazed surface
 - Smooth surface
 - Oily surface
 - Coated surface

2. (a) Define Nusselt, Reynolds and Prandtl Numbers

(5)

(b) Velocity distribution for a flow over a flat plate, given that

$$\frac{u}{u_{\infty}} = \frac{3}{2} \left(\frac{Y}{\delta} \right) - \frac{1}{2} \left(\frac{Y}{\delta} \right)^3$$

Where,

u -velocity of flow

u_{∞} - free stream velocity

δ - velocity boundary layer thickness

- (i) Draw the corresponding fully developed hydrodynamic boundary layer and velocity profile.
 - (ii) Find out the displacement thickness in terms of velocity boundary layer thickness (δ). (10)
3. (a) Draw the natural convection current for hot horizontal and vertical plates kept in a quiescent medium. Mark the velocity and temperature profiles for hot vertical plate. (5)
- (b) A cylindrical body of 300 mm diameter and 1.6 m height is maintained at a constant temperature of 36.5°C. The surrounding temperature is 13.5°C. Determine the heat lost from the surface by natural convection per hour if $\rho = 1.025 \text{ kg/m}^3$; $C_p = 960 \text{ J/kg } ^\circ\text{C}$; $\beta = 15.06 \times 10^{-6} \text{ m}^2/\text{s}$; $k = 89.2 \text{ J/mh } ^\circ\text{C}$ and $\beta_{13} = 1/298 \text{ K}^{-1}$. Assume $Nu = 0.12 (\text{Gr.Pr})^{1/3}$. (10)
4. (a) Air at 20°C and 1 atm flows over a flat plate at 40 m/s. The plate is 80 cm long and is maintained at 60°C. Assuming unit depth in the z direction, calculate the heat transfer from the plate, Properties of air at 40°C are: $Pr = 0.7$, $k = 0.02723 \text{ W/mK}$, $c_p = 1.007 \text{ kJ/kgK}$ and $\mu = 1.906 \times 10^{-5} \text{ kg/ms}$. (7)
- (b) In a parallel flow heat exchanger operating under steady state, the heat capacity rates of the hot and cold fluid are equal. The hot fluid, flowing at 1 kg/s with $C_p = 4 \text{ kJ/kgK}$, enters the heat exchanger at 102°C while the cold fluid has an inlet temperature of 15°C. The overall heat transfer coefficient for the heat exchanger is estimated to be 1 kW/m²K and the corresponding heat transfer surface area is 5 m². Neglect heat transfer between the heat exchanger and the ambient. The heat exchanger is characterized by the following relation : $2\varepsilon = 1 - \exp(-2NTU)$. Determine exit temperature (in °C) for the cold fluid? (8)
5. (a) In a solar assisted air-conditioning system. 0.5 kg/s of ambient air at 270 K is to be reheated by the same amount of air leaving the system at 295 K. If a counter flow heat exchanger has an area of 30m² and the overall heat transfer coefficient is 25w/m²K. Determine the outlet temperature of the preheated air. Take C_p for air as 1000 J/kgK. (7)
- (b) A coaxial tube counter flow heat exchanger is used to cool 0.03 kg/s of benzene from 87°C to 37°C with a counter flow of 0.02 kg/s of water initially at 17°C. If the inner tube outside diameter is 2 cm and the overall heat transfer coefficient based on outside area is 650 Wm²/°C, determine the required length of the exchanger. Take the specific heats of benzene and water as 1880 and 4175 J/kg°C respectively. (8)

6. (a) Write short note on Orifice meter and Venturi meter. (5)
- (b) Briefly describe about Subcooled boiling and Saturated boiling. (5)
- (c) Draw boiling curve for pool boiling of water at saturation temperature and pressure and mark different boiling regimes. (5)
7. (a) Discuss the analogy between heat and mass transfer. (5)
- (b) A fluid which is heated by a hot vertical plate and forced up due to buoyancy has seven variables that influence the heat transfer. They are heat transfer coefficient (h), fluid density (ρ), plate length (L), fluid dynamic viscosity (μ), thermal conductivity (k), specific heat (c_p) and buoyancy force ($\beta g \Delta T$). Find the possible dimensionless groups from these variables to estimate the heat transfer coefficient using dimensional analysis. (10)
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2022

B.Tech. 6th Semester End-Term Examination

HEAT TRANSFER – II

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

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Total No. of printed pages = 3

ME 181603

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2022

B.Tech. 6th Semester End-Term Examination

MECHANICAL MEASUREMENTS AND INSTRUMENTATION

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the most appropriate one from given four alternatives : (10 × 1 = 10)
- (i) In measurement systems, which of the following are undesirable static characteristics :
- (a) Sensitivity and accuracy
 - (b) Drift, static error, and dead zone
 - (c) Reproducibility and non-linearity
 - (d) Drift, static error, dead zone, and non-linearity
- (ii) Identify the correct statement from the following.
- (a) LVDT is an active transducer
 - (b) At null point the output voltage of LVDT should be maximum
 - (c) LVDT can tolerate a high degree of shock and variation, especially when the core is loaded with spring
 - (d) LVDT does not get affected by the vibrations and temperature variation
- (iii) For a given strain gauge, the relative change in electrical resistance to mechanical strain $\frac{dR/R}{dL/L}$ is called
- (a) Stress factor
 - (b) Gauge factor
 - (c) Resistivity
 - (d) Poisson's ratio

[Turn over

- (iv) Which transducer measure changes in acceleration, pressure, strain and temperature?
- (a) Photoelectric transducer
 - (b) Capacitive transducer
 - (c) Piezo-electric transducers
 - (d) Inductive transducer
- (v) Which of the following is a practical application of Strain Gauge:
- (a) Cables of civil bridges
 - (b) Railway Engineering
 - (c) Aerospace Engineering
 - (d) All of these
- (vi) Photoconductive transducers produce output _____
- (a) due to change in inductance
 - (b) due to change in light
 - (c) due to change in resistance
 - (d) due to change in temperature
- (vii) Which of the following conditions is/are to be satisfied by the seismometer for it to be used as velometer?
- (a) It's natural frequency should be large
 - (b) It's natural frequency should be small
 - (c) It's output signal should be proportional to relative acceleration of the vibrating body
 - (d) None of the above
- (viii) The output of a flowmeter based on electromagnetic induction has
- (a) Variable frequency
 - (b) Variable amplitude
 - (c) Variable frequency and amplitude
 - (d) Variable dc amplitude
- (ix) A CRO indicates
- (a) Peak to peak value of voltage
 - (b) RMS value of voltage
 - (c) Average value of voltage
 - (d) DC value of voltage

- (x) X - Y recorders
- Record one quantity with respect to another quantity
 - Record one quantity on X-axis with respect to time on Y-axis
 - Record one quantity on Y-axis with respect to time on X-axis
 - None of the above
2. (a) Explain different types of instrumentation systems. (3)
- (b) Describe in detail the different types of dynamic errors in a measurement system. (5)
- (c) Four length bars A, B, C, D of approximately 250 mm each are to be calibrated with standard calibrated metre bar which is actually 0.0008 mm less than a metre. It is also found that, bar 'B' is 0.0002 mm longer than bar 'A', bar 'C' is 0.0004 mm longer than bar 'A' and bar 'D' is 0.0001 mm shorter than bar 'A'. The length of all four bars put together is 0.0003 mm longer than the calibrated standard metre. Determine the actual dimensions of each bar. (7)
3. (a) With a block diagram, distinguish between primary and secondary transducers. (7)
- (b) Derive an expression for gauge sensitivity of a strain gauge for measurement of strain on account of force acting on a cantilever using four active strain gauges. (8)
4. (a) Describe the different modes of operation of piezo electric transducers. (7)
- (b) What is the principle of inductive torque transducer? (4)
- (c) What are the different types of magneto-strictive transducer? (4)
5. (a) What is the principle of photoelectric tachometer? Explain with neat figure. (5)
- (b) Explain the working of electrical resistance type thermometer. (8)
- (c) A thermometer has a time constant of 3.5s. it is quickly taken from a temperature degree celsius to a water bath having temperature 100 degree celsius. What temperature will be indicated after 1.5s? (2)
6. (a) Explain the principle of turbine flow meter. What is the output of a turbine meter? (7)
- (b) With neat figure explain the working principle of a CRO. (8)
7. (a) Draw a neat diagram on X-Y recorder. (3)
- (b) What are the different types of magnetic recording? (4)
- (c) Explain about different data display and storage systems. (8)

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ME 181602

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2022

B.Tech. 6th Semester (Regular) End-Term Examination

FLUID MECHANICS – II

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the correct answer from the followings : (10 × 1 = 10)

(i) Stagnation point is the point in fluid mechanics where the velocity of the fluid at that point is

(a) zero

(b) infinite

(c) constant

(d) unity

(ii) With the increase in pressure, the exit velocity _____

(a) Decreases

(b) Increases

(c) Same

(d) Independent

(iii) Normal shock waves are _____ to the local flow.

(a) Parallel

(b) Perpendicular

(c) Same

(d) Independent

(iv) The maximum velocity in a circular pipe when flow is laminar occurs at

(a) The top of the pipe

(b) The bottom of the pipe

(c) The centre of the pipe

(d) Not necessarily at the centre

[Turn over

- (v) The shear in turbulent flow is mainly due to
- (a) Heat transfer (b) Mass transfer
(c) Momentum transfer (d) All of the above
- (vi) Eddies are in the turbulent flows give result in _____
- (a) high diffusion coefficients (b) low diffusion coefficients
(c) high value of the sourced (d) low value source term
- (vii) For viscous flow the co-efficient of friction is given by
- (a) $f = 8/Re$ (b) $f = 16/Re$
(c) $f = 32/Re$ (d) $f = 60/Re$.
- (viii) The layer through which the momentum and energy transfer take place via the movement of macroscopic lumps of matter from one region to another is called as
- (a) the laminar sublayer (b) the buffer layer
(c) the turbulent layer (d) none of the above
- (ix) The layer above the laminar sublayer with some turbulence and still having importance of viscous action is called as
- (a) sub-sublayer (b) turbulent layer
(c) buffer layer (d) none of the above
- (x) If Mach number is, $M < 1$ then the flow is
- (a) sonic flow (b) supersonic flow
(c) sub sonic flow (d) none of the above
2. (a) Explain the term coefficient of friction. On what factors does this co-efficient depend? (5)
(b) Derive an expression for the loss of head due to friction in pipes. (10)
3. (a) Define compressible flow. What do you understand by stagnation pressure? (5)
(b) Prove that the maximum velocity in a circular pipe for viscous flow is equal to two times the average velocity of the flow. (10)

4. (a) What do you mean by Prandtl mixing length Theory? (5)
- (b) A smooth pipe of diameter 400 mm and length 800 m carries water at the rate of $0.04 \text{ m}^3/\text{s}$. Compute the head loss due to friction, wall shear stress, center-line velocity and thickness of laminar sublayer. Take the kinematic viscosity of water as 0.018 stokes. (10)
5. (a) Define the terms: Mach angle and Mach Cone. (5)
- (b) A fluid of viscosity 0.5 poise and specific gravity 1.20 is flowing through a circular pipe of diameter 100 mm. The maximum shear stress at the pipe wall is given as 147.15 N/m^2 ,
Calculate :
(i) the pressure gradient,
(ii) the average velocity,
(iii) the Reynolds number of the flow. (10)
6. (a) What is meant by boundary layer? Why does it increases with distance from the upstream edge? (5)
- (b) For the velocity profile for laminar boundary layer $\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^3$.
Determine the boundary layer thickness, Shear stress and drag force in terms of Reynold number. (10)
7. (a) An aeroplane is flying at an height of 15 km where the temperature is -50°C . The speed of the plane is corresponding to $M = 2.0$. Assuming $k = 1.4$ and $R = 287 \text{ J/kg } ^\circ\text{K}$. Calculate the speed of the plane. (5)
- (b) A nozzle of diameter 20 mm is fitted to a large tank which contains air at 20°C . The air flows from the tank into atmosphere. For adiabatic flow, Compute the mass rate of flow of air through the nozzle when pressure of air tank is :
(i) 5.886 N/cm^2 (gauge),
(ii) 29.43 N/cm^2 (gauge)
Take $k = 1.4$, $R = 287 \text{ J/kg K}$ and atmospheric pressure = 9.81 N/cm^2 . (10)

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ME 181604

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2022

B.Tech. 6th Semester End-Term Examination

WORKSHOP THEORY AND PRACTICE – II

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)
- (i) When resistance spot welding, which of the following materials for the same dimensions will have the highest weldability?
- (a) Copper
 - (b) Mild steel
 - (c) Acrylic
 - (d) Aluminium
- (ii) In which of the following arc welding processes the arc would have the highest power density?
- (a) Shielded Metal Arc Welding
 - (b) Gas Tungsten Arc Welding
 - (c) Plasma Arc Welding
 - (d) Flux Cored Arc Welding
- (iii) Which of the following values of rake angle results in enhancing tool life by increasing mechanical strength and reducing temperature at the tool tip?
- (a) Negative
 - (b) Zero
 - (c) Positive
 - (d) None of these

[Turn over

- (iv) During GTAW, the lowest penetration is achieved in _____ polarity.
- (a) DCEN
 - (b) AC
 - (c) DCEP
 - (d) Both (a) and (c)
- (v) Size of the built-up-edge _____ with increase in cutting velocity.
- (a) increases
 - (b) increases and then decreases
 - (c) decreases
 - (d) decreases and then increases
- (vi) In Electrochemical Machining (ECM), the primary mechanism of material removal is _____
- (a) etching
 - (b) ionic dissolution
 - (c) spark erosion
 - (d) chemical corrosion
- (vii) Which of the following methods may not be a suitable choice for machining ceramics, glass and plastics?
- (a) USM
 - (b) AJM
 - (c) EDM
 - (d) LBM
- (viii) The _____ file format has become the Rapid Prototyping industry's de facto standard data transmission format.
- (a) STL
 - (b) DWG
 - (c) 3DP
 - (d) FDM
- (ix) Choose the incorrect statement:
- (a) Submerged arc welding can't be used for fillet weld
 - (b) The electrode used in resistance spot welding is usually made up of copper
 - (c) Soft materials are difficult to machine by the abrasive jet machining process
 - (d) Directrix is the line generated by the feed motion

- (x) Choose the correct statement:
- (a) Ideal properties of a material suited for Laser Beam Machining include high heat of fusion
 - (b) USM often uses a slurry comprising abrasive-particles and water
 - (c) Fixture is a type of jig with additional feature of tool guidance
 - (d) In comparison with constant voltage power sources, constant current power sources have higher arc length variation
2. (a) An orthogonal cutting operation is performed with a tool of rake angle 15° . The chip thickness before the cut = 0.305 mm and width of cut = 2.54 mm. The chip thickness ratio is measured after the cut to be 0.55. Determine
- (i) the chip thickness after the cut,
 - (ii) shear angle,
 - (iii) the average coefficient of friction between the tool and the chip, and
 - (iv) shear strain. (7)
- (b) With the help of neat sketches discuss the basic major types of chips and the conditions generally under which such types of chips form. (8)
3. (a) What is the need of jigs and fixtures in mass production? List few advantages of using jigs and fixtures. (5)
- (b) A Workshop Supervisor has to choose a suitable non-traditional machining process for machining Inconel-718, a nickel-based superalloy widely used in the aviation field. The application is a blind-hole of depth 15 mm in a cube of side 20 mm. The hole has a square cross-section of side 5 mm. Identify anyone non-traditional machining process that might be used and present argument(s) to support your selection. With neat sketches describe the process selected by you. Also mention the advantages and limitations of the process.
4. (a) The cutting speed during turning a job is reduced by 50%. Using Taylor equation for tool life and assuming $n=0.5$ and $C=120$, calculate the percentage change in tool life. Is it desirable to have high values of n and C ? Give reason(s). (5)
- (b) What is the technical difference between brazing and soldering? Under what circumstances would brazing or soldering be preferred over welding? (1+3)
- (c) With neat sketches compare constant current and constant voltage power sources used in electric arc welding. (6)

5. (a) The voltage - arc length characteristic of a dc arc is given by, $V = (20 + 4l)$ volts, where l = length of the arc in mm. During a welding operation, it is expected that the arc length will vary between 4 mm and 6 mm. It is desired that the welding current is limited to the range 450-550 A. Assuming a linear power source characteristic, determine the open circuit voltage and the short circuit current of the power source. (5)
- (b) Why is the oxyacetylene welding process favoured over the other oxyfuel welding processes? With the help of neat sketches explain the regions, characteristics and applications of the different oxyacetylene gas welding flames. (1+9)
6. (a) What is the difference between oblique machining and orthogonal machining? (2)
- (b) With the help of neat sketches explain the effect of the following process parameters on material removal rate in abrasive jet machining:
- (i) Stand-off distance and
- (ii) Abrasive flow rate (3)
- (c) The cutting force and thrust force in an orthogonal cutting operation are 1470 N and 1589 N, respectively. The rake angle = 5° , the width of the cut = 5.0 mm, the chip thickness before the cut = 0.6 mm, and the chip thickness ratio = 0.38. Determine
- (i) the shear strength of the work material and
- (ii) the coefficient of friction in the operation. (10)
7. Write short notes on any *three* of the following: (3 × 5 = 15)
- (a) Fool proofing in work holding devices
- (b) Globular metal transfer in GMAW
- (c) Stereolithography
- (d) Friction Stir Welding
- (e) Selective Laser Sintering.

Total No. of printed pages = 3.

ME 181601

Roll No. of candidate

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2022

B.Tech. 6th Semester End-Term Examination

MACHINE DESIGN — II

(New Regulation & New Syllabus)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

Use of Design Data Handbook permitted.

1. Pick the correct option from the following: (10 × 1 = 10)
- (i) A compression spring is made of music wire of 2 mm diameter having a shear strength and shear modulus of 800 MPa and 80 GPa respectively. The mean coil diameter is 20 mm, free length is 40 mm and the number of active coils is 10. If the mean coil diameter is reduced to 10 mm, the stiffness of the spring is approximately
 - (a) decreased by 8 times
 - (b) decreased by 2 times
 - (c) increased by 2 times
 - (d) increased by 8 times
 - (ii) For a ductile material, toughness is a measure of
 - (a) Resistance to scratching
 - (b) Ability to absorb energy up to fracture
 - (c) Ability to absorb energy till elastic limit
 - (d) Resistance to indentation
 - (iii) While designing a Journal Bearing, if K is the bearing modulus, for hydrodynamic condition, the bearing is designed at a value beyond:
 - (a) 1.5 K
 - (b) 2.0 K
 - (c) 2.5 K
 - (d) 3.0 K

[Turn over

- (iv) A ball bearing operating at a load F has 8000 hours of life. The life of the bearing, in hours, when the load is doubled to $2F$ is:
- (a) 8000
 - (b) 6000
 - (c) 4000
 - (d) 1000
- (v) A Ball bearing has to operate for 8 hours per day with 90% days of operation in a year for an expected life of 4 years at 600 rpm. What is the life of the bearing in Millions of revolutions?
- (a) 678.43
 - (b) 824.23
 - (c) 428.34
 - (d) 554.23
- (vi) If in a circular helical spring mean Coil diameter is 12 cm and wire diameter is 12 mm, what is the value of the spring index?
- (a) 1
 - (b) 10
 - (c) 100
 - (d) 1000
- (vii) The capacity of a brake depends on
- (a) the unit pressure between the braking surfaces
 - (b) the coefficient of friction
 - (c) heat radiating capacity of the brakes
 - (d) all the above
- (viii) Rolling contact bearings are also called
- (a) Non Friction Bearings
 - (b) Less friction Bearings
 - (c) Anti Friction Bearings
 - (d) Thrust Bearings
- (ix) The steering mechanism of an automobile normally uses
- (a) Bevel gear
 - (b) Worm gear
 - (c) Rack and Pinion
 - (d) Planetary gear

(x) Fill in all the blank spaces:

The basic static load rating is defined as the static radial load (in case of _____ bearings) or axial load (in case of _____ bearings) which corresponds to a total permanent deformation of the ball (or roller) and race, at the most heavily stressed contact, equal to _____ times the ball (or roller) diameter.

2. (a) A critical section in a solid shaft of 80mm diameter subjected to a twisting moment of 50 kNm, a bending moment of 20 kNm and an axial (compressive) thrust of 60 kN. Determine the maximum value of normal stresses and shear stresses in that section.
- (b) A steel rod (SAE 1095 Annealed) of circular cross section is subjected to axial load varying from 20kN to 50 kN, as the bending moment varies from 500 Nm to 1000 Nm. The maximum BM and maximum axial load occurs at the same instant. Determine the diameter of the rod. Material properties may be selected from IS Codes. (7+8=15)
3. (a) What is the significance of Walh's Stress Concentration factor in the design of springs?
- (b) Design a closed coil helical spring for a service ranging from 4000 N to 4300 N. The axial deflection for the load range is 10 mm. The allowable shear stress of the spring material is 400 MPa and $G = 84 \text{ kN/sq. mm.}$ (2+13= 15)
4. (a) Differentiate between Positive Clutch and Friction Clutch.
- (b) Design a single dry plate clutch to transmit 15 kW at 1200 rpm. Six numbers of identical springs are used with Spring Index of 6. (2 +13= 15)
5. A pair of involute teeth spur gears has to transmit 30 kW when the pinion rotates at 400 rpm. The velocity ratio is 1:3. The pinion has 24 numbers of teeth. Assuming suitable material, design the gear drive and check for all possible failures. (15)
6. (a) What is the importance of bearing modulus in journal bearing design?
- (b) Select a deep groove ball bearing which is subjected to a radial load of 3000N and axial load of 500N operating at 1200 rpm for an average life of 3.5 years at 10 hours per day. (2 +13= 15)
7. (a) What is the basic difference between a double helical and a herringbone gear?
- (b) Design a Journal Bearing to support a shaft of 50 mm diameter for use in a Centrifugal Pump for a maximum load of 25 kN and maximum journal speed of 1000 rpm. Consider an ambient temperature of 30 degree centigrade. (2 +13= 15)