(DME 311)

B.Tech. DEGREE EXAMINATION, DECEMBER. - 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper - I : Operations Research

Time : 03 Hours **Maximum Marks : 75**

Answer Question No.1 is compulsory ***(15)***

Answer One question from each unit ***(4×15=60)***

1) Write a short notes on the following

a) Critical path

b) Markovian chain

c) Linear programming

d) Transition diagram

e) Dynamic programming.

UNIT –I

2) a) Explain Applications of LPP.

b) Solve the following LPP by Graphical method. Maximize z = 40x +30y subject to the constraints,

$50x + 36y \leq 100000$

$25x + 36y \leq 100000$

$x , y \geq 0.$

OR

3) Explain limitations and Model building of/in operations research.

UNIT –II

4) Explain Vogel's opproximation method and assignment by inspection method.

OR

5) Explain Queuing systems and their characteristics and Analysis of Markovian chains.

UNIT –III

6) With neat sketches explain the following

a) Rules for drawing network diagram.

b) Common errors in drawing networks.

OR

7) Explain pert and CPM and critical path calculations.

UNIT –IV

8) a) Explain the characteristics of D.P model

b) Limitations of operations Research.

OR

9) Describe optimal solution of two-sum games with an example.

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(DME 312)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper - II : Design of Machine Elements

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer one question from each unit ***(4×15 = 60)***

1) Write short notes on the following.

a) Phases of design.

b) Stress strain relation.

c) Endurance limit and its importance.

d) Power screws.

e) Types of Bolted joints.

f) Types of welded joints.

UNIT - I

2) a) Discuss the various steps involved in designing of machine element.

b) What are the important factors to be considered for the selection of materials.

OR

3) a) Define 'factor of safety' and 'combined stress'.

b) Explain any three different theories of elastic failure with equations.

UNIT - II

4) a) Discuss the effect of stress concentration in machine members.

b) Explain the relative features of Goodman and Soderberg equations.

OR

5) A steel rod is subjected to a tensile load which varies from 40kN to 120kN. Find the safe cross-sectional area of the bar. Take factor of safety = 2, yield point of the material = 570 MN/m^2 and endurance limit of the material =350 MN/m^2.

UNIT - III

6) Design a Lap Joint for a mild steel flat tie-bar 200mm×10mm Thick, using 24mm diameter rivets. Assume allowable stresses in tension and compression of the plate material as 112 MPa and 200MPa respectively and shear stress of the rivets as 84 MPa. Show the disposition of the rivets for maximum joint efficiency and determine the joint efficiency. Take diameter of rivet hole as 25.5 mm for a 24mm diameter rivet.

OR

7) a) What do you mean by a uniform strength of riveted joint? Give an example with a suitable sketch.

b) A welded joint, as shown in figure 1, is subjected to an eccentric loading of 2500 N. Find the size of the welds, if the maximum shear stress in the weld is not to exceed 50 N/mm^2.

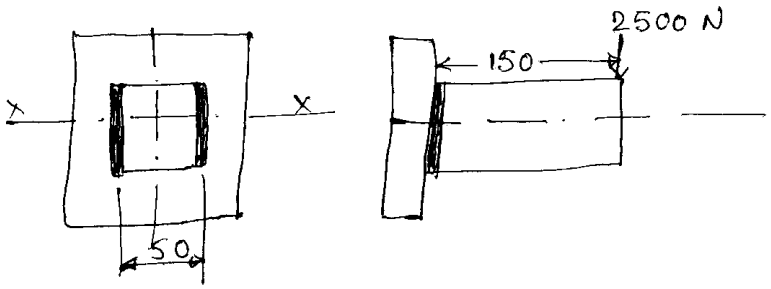


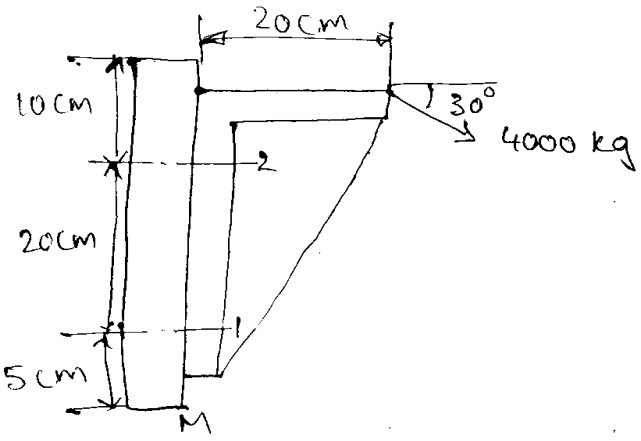
figure-1

UNIT - IV

8) Design a socket and spigot cotter joint to transmit a load of 50kN. The allowable tensile stress is 60 N/mm^2, allowable shear stress is 45 N/mm^2 and allowable crushing stress is 100 N/mm^2. Show a neat sketch of the joint.

OR

9) A bracket is attached to a column by means of 4 bolts as shown in figure calculate the size of bolts used if the permissible tensile stress and shear stress is 80 MPa and 60 MPa respectively.


20cm
10cm
30°
4000 kg
2
20cm
1
5cm
M

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B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper - III : Machine Dynamics

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) Write a short notes on the following.

a) Effective driving force.

b) Secondary Balancing.

c) Types of Dynamometers.

d) Gyroscopic couple.

e) Effort of a Governor.

UNIT - I

2) a) State and explain D' Alembert's principle.

b) Determine the required input torque on the crank of Aslider-Crank mechanism for the static equilibrium when the applied piston load is 1500 N. The lengths of the crank and the connecting rod are 40mm and 100mm respectively and the crank has turned through 45º from the inner dead centre.

OR

3) a) Derive the expressions for the displacement, velocity and acceleration of the piston of a reciprocating engine in terms of the crank radius connecting rod length crank angle θ from the inner dead centre and the angular velocity w of the crank.

b) An engine flywheel has mass of 6.5 tonnes and the radius of gyration is 2m. If the maximum and minimum speeds are 120 rpm and 118 rmp respectively, find the maximum fluctation of energy.

UNIT - II

4) Explain clearly the difference in the nature of unbalance caused by primary and secondary disturbing forces in the case of a reciprocating mass. What is the essential difference between the unbalance caused by a reciprocating mass and that caused by a revolving mass?

OR

5) Three masses m_1, m_2 and m_3 of 10 kg, 9kg and 16kg respectively revolve in the same plane at radii 10cm 12.5cm and 5cm respectively. The angular positions of m_2 and m_3 are 60^o and 135^o respectively from m_1. Determine the position and magnitude of the mass m_4 at a radius of 15cm required to balance the system.

UNIT - III

6) The turbine rotor of a ship has a mass of 20 tonnes and a radius of gyration of 0.75m. It's speed is 2000 rpm. The ship pitches 6^o above and below the horizontal position one complete oscillation takes 18 seconds and the motion is simple harmonic. Determine

(a) The maximum couple tending to shear the holding down bolts of the turbine

(b) The maximum angular acceleration of the ship during pitching and

(c) The direction in which the how will tend to turn while rising if the rotation of the rotor is clockwise when looking from rear.

OR

7) a) What is the difference between absorption and transmission dynamometers? What are tortion dynamometers?

b) A bicycle and rides of mass 100kg are travelling at the rate of 16 km/hr on a level road. A brake is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bycycle travel and how many turns will it make before it comes to rest? The pressure applied on the brake is 100 N and coefficient of friction is 0.05.

UNIT - IV

8) Explain with neat sketch the working of Wilson-Hart nell Governor.

OR

9) In a hartnell governor, the lengths of the ball and the sleeve arms are equal. The extreme radii of rotation of the balls are 60mm and 80mm and the corresponding speeds are 160 rpm and 175 rpm. Each ball has a mass of 2kg. Find the spring stiffness and the initial compression of the central spring.

(DME 314)

B.Tech. DEGREE EXAMINATION, DECEMBER - 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper - IV : Hydraulic Machines

Time : 03 Hours **Maximum Marks : 75**

Answer Question No.1 is compulsory ***(15)***

Answer One question from each unit ***(4×15=60)***

1) Write short notes on the following

a) Types of sprinklers.

b) Elements of hydro electric power plants.

c) Negative slip

d) Minimum starting speed

e) Limitation of suction lift

f) Dimension less numbers.

UNIT -I

2) a) Derive the expression for the force exerted by a jet on a stationary curved plate when the jet strikes the curved plate at one end tangentially when the plate is unsymmetrical.

b) A jet of water moving at 18 m/s impinges on a concave shaped vane to deflect the jet through 110^{o} when stationary. If the vane is moving at 8m/s, find the angle of jet so that there is no shock at inlet. Also compute the absolute velocity of jet at exit both in magnitude and direction and the work done per second per N of water. Assume that the vane is smooth.

OR

3) A 4cm diameter water jet with a velocity 35m/s impinges on a single vane moving in the same direction at a velocity of 20m/s. The jet enters the vane tangentially along the *x* direction. The vane deflects the jet by 150º. Calculate the force exerted by the water on the vane.

UNIT –II

4) a) How will you classify the turbines?

b) Differentiate between turbines and pumps.

OR

5) A francis turbine is working under a head of 80m and the discharge is 2.2m^3/s. The velocity of flow, assumed constant through the runner is 16m/sec. The runner blade angle at inlet in 90º, the width of the blade at inlet is 0.12 times the diameter at inlet and the outlet diameter is 0.55 times the inlet diameter. Calculate the outlet angles of the guide and runner blades, wheel diameter and the hydraulic efficiency when the wheel in rotating at 500 rpm and the discharge are axial. (Assume that 10% of the flow area is blocked by the finite thickness of the blades).

UNIT –III

6) a) How does the reciprocating pump work? What are the functions of air versels used in reciprocating pumps?

b) A double acting reciprocating pump has a plunger of diameter 300mm and of stroke of 200mm. If the speed of the pump is 0.5rps and it delivers 8.2 liter/s of water, then calculate coefficient of discharge and percentage slip of the pump.

OR

7) a) Discuss in general the main operating characteristics of a centrifugal pump. What is the importance of constant efficiency curves?

b) What are the effects of cavitation.

UNIT -IV

8) a) What is a Hydraulic accumulator? Discuss the merits and demerits of weight loaded and air-hydraulic accumulator?

b) Explain the significance of Hydraulic lift.

OR

9) a) Explain the BUCKINGHAM'S pi theorem.

b) Distinguish between Reynolds law and Froude laws.

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(DME 315)

B. Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper – V : I.C. Engines and Gas Turbines

Time : 3 Hours **Maximum Marks: 75**

Answer Question No. 1 is compulsory ***(15)***

Answer One question from each unit ***(4 × 15 = 60)***

1) a) Why compression ratio of petrol engines is low while diesel engines have high compression ratio?

b) State any four functions of carburetor.

c) What is the effect of the compression ratio on the performance of an SI engine.

d) What are the advantages of liquid fuels over the solid fuels.

e) What is meant by delay period in CI engine?

f) What are the basic components of a gas turbine plant?

g) State the general applications of rotary compressor.

UNIT - I

2) a) Explain the working principle four stroke diesel engine with neat sketch.

b) Draw and explain the value timing diagram for four stroke diesel engine.

OR

3) Sketch a simple tube carburetor, name its different parts and explain their functions.

UNIT - II

4) A four-stroke cycle gasoline engine has six-single acting cylinders of 8 cm bore and 10 cm stroke. The engine is coupled to a brake having a torque radius of 40 cm. At 3200 rpm, with all cylinders operating the net brake load is 350 N. When each cylinder in turn is rendered inoperative, the average net brake load produced at the same speed by the remaining 5 cylinders is 250 N. Estimate the indicated mean effective pressure of the engine. With all cylinders operating the fuel consumption is 0.33 kg/min; calorific value of fuel is 43 MJ/kg; the cooling water flow rate and temperature rise is 70 kg/min and 10°C respectively. On test, the engine is enclosed in a thermally and acoustically insulated box through which the output drive, water, fuel, air and exhaust connections pass. Ventilating air blown up through the box at the rate of 15 kg/min enters at 17°C and leaves at 62°C. Draw up a heat balance of the engine stating the items as a percentage of the heat input.

OR

5) a) What are the different kinds of fuels in an IC engines?

b) One kg of ethane (C_2H_6) is burned with 90% of theoretical air. Assuming complete combustion of hydrogen in the fuel, determine the volumetric analysis of the dry products of combustion.

UNIT - III

6) a) How are SI and CI engine fuels rated?

b) Briefly explain the stages of combustion in SI engines elaborating the flame front propagation.

OR

7) a) What is a Rotary compressor? How are rotary compressors classified?

b) Briefly explain the terms surging, choking and stalling.

UNIT – IV

8) A gas turbine has a pressure ratio of 6:1 and a maximum cycle temperature of 600°C. The isentropic efficiencies of the compressor and turbine are 0.82 and 0.85 respectively. Calculate the power output in kilowatts of an electric generator geared to the turbine when

the air enters the compressor at 15°C at the rate of 15 kg/s. Assume Cp = 1.005 kJ/kg K and γ = 1.4 for the compression process and Cp = 1.11 kJ/kg K and γ = 1.333 for the expansion process.

OR

9) a) Explain the working principle of jet propulsion with neat sketch.

b) What is ram jet? Explain the working of ram jet with neat sketch.

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(DME 316)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Third Semester)

MECHANICAL ENGINEERING

Paper - VI : Metal Cutting & Machine Tools

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) a) What is a machine tool?

b) What are the various types of lathe?

c) Name the various accessories used on lathe.

d) What is 'reamer'?

e) Principle of planner.

f) What is the purpose of honing? Give the examples of honing work.

g) Different types of chips.

UNIT - I

2) a) What are the function of a machine tool? How they classified?

b) Discuss briefly the procedure for cutting threads on lathe.

OR

3) A workpiece of 250mm diameter and 500 mm length is to be turned down to 235 mm diameter for the entire length. The suggested feed is 1 mm/revalution and cutting speed is 135 m/min. The maximum allowable depth of cut is 5.0 mm. Calculate:

i) Spindle rpm. ii) Feed rate.

iii) Material removal rate. iv) Cutting time.

UNIT - II

4) a) With a neat sketch explain the radial drilling machine.

b) Explain briefly with sketches any four drilling machine operations.

OR

5) a) Explain the quick Return mechanism in shaper.

b) Explain briefly the 'lapping process'. Give the example of lapping work.

UNIT - III

6) a) Explain about up and down milling processes.

b) Name the various operations which can be performed on a milling machine.

c) How are milling machines broadly classified?

OR

7) What is indexing? Explain about various indexing methods.

UNIT - IV

8) a) With the help of neat sketches, explain briefly the tool elements and tool angles is case of a single point tool.

b) During orthogonal cutting a bar of 75 mm diameter is reduced to 73 mm. If the mean length of the cut chip is 73.5 mm and rake angle is 15°. Calculate:

i) Cutting ratio.

ii) Shear angle.

OR

9) a) State the factors which affect tool life.

b) What are the functions of cutting fluids?

c) Explain about cutting tool materials.

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(DME 321)

B. Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper – I : Operations Management

Time : 3 Hours **Maximum Marks: 75**

Answer any FIVE questions.

All questions carry equal marks.

1) What are the advantages of intermittent production?

2) Give an account of various production functions.

3) Explain the procedure involved in forecasting.

4) State different methods of aggregate planning.

5) Bring out the functions of master scheduling.

6) Classify inventories with examples.

7) Discuss XYZ and VED analyses of inventory control.

8) What is the effect of quantity discount on EOQ?

9) How are tolerance limits for a process fixed?

10) Describe reliability as a function of time.

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(DME 322)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper - II : Design of Transmission Elements

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) Write a short notes on following:

a) Properties of lubricants.

b) Bearing materials.

c) Types of Belt drives.

d) Classification of gears.

e) Selection of chain drives.

UNIT - I

2) a) A 100mm diameter pulley is keyed to a 50mm shaft by a 16mm square key of length 150mm. The tension in the right side of the belt is 5000N and tension ratio is 2:1. Find the shear and compressive strength 350 N/mm^2 and ultimate shear strength 250N/mm^2.

b) Prove that a square key in equally strong in shear and compaign.

OR

3) Design a shaft coupling to transmit 10kW at 1000 rpm. The permissible stress for the coupling and key are 65, 35 and 100Mpa, in tension, shear compression respectively. Draw free hand sketch of the coupling showing important dimensions.

UNIT - II

4) It is required to design a journal bearing for a centrifugal pump running at 1200 rpm. The journal is of 80mm and load on each journal is 18kN. The factor ZN/P for bearing is 2600. The length and diameter ratio is 1:2. Take correction factor as 0.002. The bearings and atmospheric temperatures are 80ºC and 30ºC respectively.

OR

5) a) Explain the terms 'Basic dynamic load rating' and 'Rating life of rolling contact bearings'.

b) A ball bearing carries a load of 2500N at 400rpm for 30% of the time and a load of 5000N at 900rpm for the remainder of the time. Life of 6 years at shows per day is expected. Find the maximum value of the basic load rating.

UNIT - III

6) A rope drive is to transmit 250kW from a pulley of 1.2m diameter, running at a speed of 300rpm. The angle of lap may be taken as π radians. The groove half angle is 22.5º. The ropes to be used are 50mm in diameter. The mass of the rope is 1.3 kg per meter length and each rope has a maximum pull of 2.2kN, the coefficient of friction between rope and pulley is 0.3. Determine the number of ropes required. If the over hang of the pulley is 0.5m, Suggest suitable size for the pulley shaft if it is made of steel with a shear stress of 40Mpa.

OR

7) Explain the design of Flat belt drive and Analyse the tensions.

UNIT - IV

8) a) Explain the procedure of evaluating module and face width of the gear drive.

b) A pair of diametral pitch, 20º full depth involute. Spur gears with a face width of 60mm is made of steel having 400 HB. The pinion has 28 teeth and runs at 1200rpm. The gear ratio is 4. What power can be transmitted as indicated by the Lewis equation? Check for dynamic and wear loads.

Assume σ_o = 210Mpa and σ_{cs} = 70 Mpa.

OR

9) Derive on expression for calculation of effective load on gear tooth.

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(DME 323)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper - III : Mechanical Vibrations

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) a) Define Mechanical Vibrations.

b) Define D'Alemberts principle.

c) What is influence coefficient?

d) Define coulomb damping.

e) What are undamped vibrations?

f) Define logarithmic decrement.

UNIT - I

2) a) Explain the vector method of representing harmonic motions.

b) An instrument has a natural frequency of 10Hz. It can stand a maximum acceleration of $10 m/sec^2$. Find the maximum displacement amplitude.

OR

3) A horizontal spring mass system with coulomb damping has a mass of 5 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.025, calculate.

a) The frequency of the free vibrations.

b) The number of cycles corresponding to 50% reduction in amplitude if the initial amplitude is 5cm.

c) The time taken to achieve this 50% reduction.

UNIT - II

4) A diesel engine of single cylinder has a mass of 500kg. and is mounted on mild steel chassis frame. The static deflection due to weight of the chassis is 2.5mm. The reciprocating masses of the engine amounts to 20kg and the stroke of the engine is 180mm. A dashpot with a damping. Coefficient of 2000 N/m/s is also used to damper. The vibrations in the steady of the vibrations, determine the amplitude of the vibrations if the driving shaft rotates at 400rpm.

OR

5) A vibrating system having mass 1.2kg is suspended by a spring of stiffness 1000N/m and it is put to harmonic excitation of 10N. Assuming viscous damping, Determine:

a) Resonant frequency.

b) Phase Angle at Resonance.

c) Amplitude at resonance.

d) Frequency corresponding to the peak amplitude.

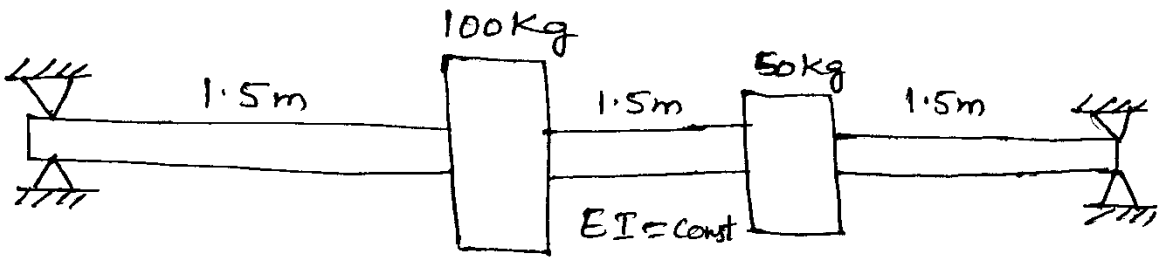
e) Damped frequency.

UNIT - III

6) What is force transmissibility? Why is it importance in mechanical vibrations? Explain with neat sketch frequency response curve of force transmissibility.

OR

7) Find the lowest natural frequency of transverse vibrations for the system shown below by stodola's method, $E = 1.96 \times 10^{11} N/m^2$. $I = 10^{-6} m^4$.



UNIT - IV

8) Determine the characteristic equation for a beam pinned at one end and free at the other end. Treat the beam as a continuous system. Take the length of the beam as L.

OR

9) Derive an expression for multi degree of freedom system.

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(DME 324)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper - IV : Basic Electronics & Microprocessors

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) a) Define static resistance and dynamic resistance of a PN j^n diode.

b) Give 4 differences between FET and BJT.

c) What is meant by Avalanche breakdown?

d) Why do we need filters?

e) What is a monostable multivibrator?

f) Convert 1101.101 to decimal.

g) Draw the truth table and logic diagram of universal gates.

h) What does MOV & MVI instructions perform?

i) What is a flip flop?

UNIT - I

2) a) Describe the action of PN junction diode under forward bias and Reverse bias conditions.

b) Using a neat figure explain the working of a UJT.

OR

3) a) Draw a neat figure and explain the working of a half wave rectifier.

b) Discuss the working of a MOSFET.

UNIT - II

4) a) With a neat sketch explain the operation of an Astable multivibrator.

b) How does an Op amp work as summer and comparator?

OR

5) a) Explain the working of a RC phase shift oscillator.

b) Show that an Op amp works as a zero cross detector.

UNIT - III

6) a) Draw the truth table and explain a half subtractor.

b) With neat figure explain T and D flip flop and also draw the truth tables of the same.

OR

7) a) Explain the working of an encoder.

b) Briefly explain the function of a shift register.

UNIT - IV

8) a) Draw the pin diagram of 8085 and explain its features.

b) Write an assembly language program to add two 8 bit numbers.

OR

9) a) How is interfacing done in 8085.

b) Write a program to arrange given numbers in Ascending order.

(DME 325)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper - V : Heat Transfer

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) a) Write the Fourier rate equation for heat Transfer by conduction.

b) Define the efficiency and effectiveness of the fin.

c) What are the assumptions for lumped heat capacity analysis?

d) What is the difference between laminar flow and turbulent flow?

e) What is Boundary layer thickness?

f) What do you mean by fouling in heat exchangers?

g) What is a black body? How does it differ from a grey body?

UNIT - I

2) Derive general heat conduction education in cylindrical co-ordinates.

OR

3) a) Derive expressions for temperature distribution and heat dissipation in a straight fin of rectangular profile for the Fin insulated at the tip.

b) Aluminium fins of rectangular profile are attached on a plane wall with 5mm spacing. The fins have thickness y = 1mm, length l = 10mm and the thermal conductivity K = 200 W/mK. The wall is maintained at a temperature 200ºC, and the fins dissipate heat by convection into the ambient air at 40ºC, with heat transfer co-efficient h = 50W/m^{2}K. Determine the heat loss.

UNIT - II

4) A steel tube of length 20cm with internal and external diameters of 10cm and 20cm is quenched from 500ºC to 30ºC in a large reservoir of water at 10ºC. Below 100ºC the heat transfer coefficient is 1.5kW/m^2K. Above 100ºC it is less owing to a film of vapour being produced at the surface and an effective mean value between 500ºC to 100ºC is 0.5 kW/m^2K. The density of the steel is 7800 kg/m^3 and the specific heat is 0.47 kJ/kgK. Determine the quenching time by neglecting the internal resistance.

OR

5) Air at 20ºC and at a pressure of 1 bar is flowing over a flat plate at a velocity of 3 m/sec. If the plate is 280 mm wide and at 60ºC, calculate the following quantities at x = 280mm.

a) Boundary layer thickness

b) Local friction co-efficient.

c) Shearing stress due to friction.

d) Thickness of the thermal boundary layer.

e) Average convective heat transfer coefficient.

f) Rate of heat transfer by convection.

g) Total drag force on the plate.

UNIT - III

6) a) What is the criterion from laminar to turbulent flow in natural convection?

b) A vertical pipe 5cm diameter and 1m high is maintained at a temperature of 65ºC in atmospheric air at 15ºC. Calculate the rate of heat loss by free convection from the cylinder to air.

OR

7) a) Sketch the temperature variations in parallel flow and counter flow heat exchangers.

b) Hot Oil with capacity rate of 2500W/K flows through a douple pipe heat exchanger. It enters at 360ºC and leaves at 300ºC. Cold fluid enters at 30ºC and leaves at 200ºC. If the overall heat transfer co-efficient is 800W/m^2K, determine the heat exchanger area required for

i) Parallel flow and

ii) Counter flow.

UNIT - IV

8) a) What is a Radiation shield? When is it used?

b) A black body emits radiation at 2000ºK. Calculate:

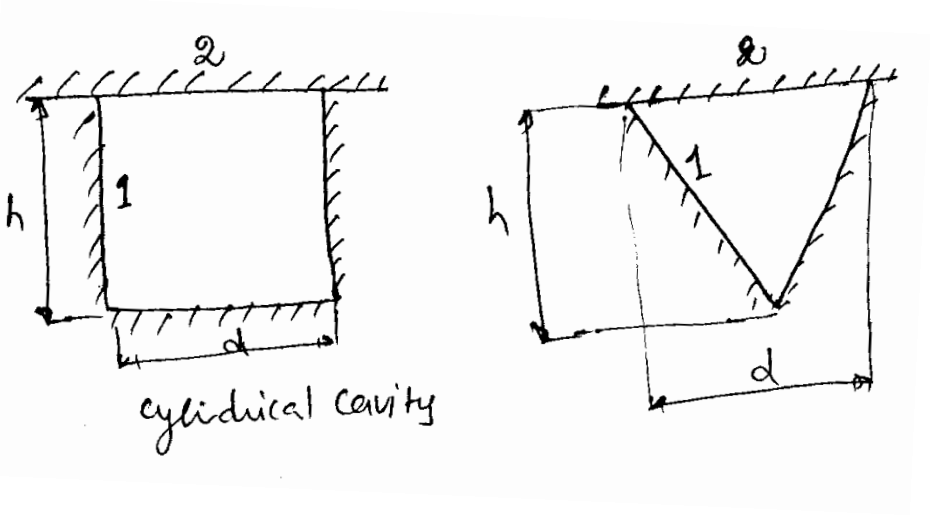
i) The monochromatic emissive power at 1μm wave length

ii) Wave length at which the emission is maximum and

iii) the maximum emissive power.

OR

9) Derive expressions for shape factors of the cavities (each enclosed on its surface with a flat surface) shown in the figure.



(DME 326)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Third Year Fourth Semester)

MECHANICAL ENGINEERING

Paper - VI : Engineering Metrology

Time : 3 Hours **Maximum Marks: 75**

Answer Question No.1 is compulsory ***(15)***

Answer ONE question from each unit ***(4×15 = 60)***

1) Write a short note on the following:

a) Ring gauges.

b) Applications of spirit levels.

c) Advantages of jigs & fixtures.

d) Best size of Wire.

e) Optical projection method?

f) Nomenclature of surface texture.

g) Importance of Dynamic alignment test.

UNIT - I

2) a) Define line and end standards, Give the sub division of standard.

b) Give details of M112 set, and build the following dimensions.

i) 49.3115

ii) 68.208

OR

3) a) Differentiate between interchange ability and selective assembly.

b) With a sketch brief the 'Hole basis' and 'shaft basis' system of fits.

UNIT - II

4) What is the purpose of clamping? Explain about any two clamping devices.

OR

5) a) What are various errors in gears? Explain, with neat sketches.

b) State the various sources of errors in manufacturing gears.

UNIT - III

6) a) What is comparator? Explain any one type of mechanical comparator.

b) What are the advantages and disadvantages of electrical and electronic comparator?

OR

7) a) Explain the various pitch errors found in screw.

b) How angles are measured using angle plates explain with one example.

UNIT - IV

8) a) What are the methods used for evaluating the surface finish? Explain.

b) Write short note on CMM.

OR

9) a) Distinguish between geometrical and practical tests on machine tools.

b) How to perform alignment test on milling? Explain.