(DME 211)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - I : Engineering Mathematics - III

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

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

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

1) a) Using sine series for $f(x) = 1$ in $(0, \pi)$ show that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$.

b) What is the value of b_n, if $f(x)$ is an even function in $(-l, l)$.

c) What is the period of constant function?

d) If fourier transform of $f(x)$is F(S), then what is its inversion formula.

e) What is the kernal of fourier transform e^{sx}.

f) State Convolution Theorem for fourier transform.

g) Find the Binomial distribution whose mean is 5 and variance is $\frac{10}{3}$.

h) What is the probability of any one sample of size n being drawn out of N units.

i) Find the value of Z if $\bar{X} = 157, \mu = 155, \sigma = 15$ and $n = 36$.

j) If the size of sample is 25 and the maximum error with 95% confidence is 0.1, then find the standard deviation of the Sample.

k) A die is thrown 256 times. An even digit turns up 150 times. Then die is?

l) A Random Sample of 400 products contain 52 Defective items. Find the standard error of proportion.

m) If the fourier sine transform of $f(x) = \frac{1-\cos n\pi}{n^2\pi^2}$, then find $f(x)$.

n) Find Fourier series expansion of $f(x) = |x|$ in $(-\pi, \pi)$.

o) What is the value of correction factor if $n = 5$ and N = 200.

UNIT - I

2) Expand $f(x) = \sqrt{1-\cos x}$, $0 < x < 2\pi$ in a fourier series. Hence evaluate $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \cdots$.

OR

3) Find the fourier series for

$f(t) = 0, \quad -2 < t < -1$

$= 1+t, \quad -1 < t < 0$

$= 1 - t, \quad 0 < t < 1$

$= 0, \quad 1 < t < 2.$

UNIT - II

4) a) Find the fourier transform of

i) $e^{-2(x-3)^2}$ ii) $e^{-x^2}.\cos 3x$

b) Using Parseval's identity, prove that

$$\int_0^\infty \frac{t^2}{(t^2+1)^2}dt = \frac{\pi}{4}$$

OR

5) a) Using the method of Residues, evaluate the inverse Laplace transform of $\frac{1}{s^2(s^2-a^2)}$.

b) Find the Fourier transform of $f(x) = \begin{cases} x & \text{if } 0 < x < 1 \\ 2-x & \text{if } 1 < x < 2 \\ 0 & \text{if } x > 2 \end{cases}$

UNIT - III

6) a) Six dice are thrown 729 times. How many times do you expect atleast three dice to show 5 or 6.

b) The mean and standard deviation of the marks obtained by 1000 students in an examination are respectively 34.5 and 16.5. Assuming the Normality of distribution, find the Approximate number of students expected to obtain marks between 30 and 60.

OR

7) a) Let S = {1, 5, 6, 8} find the probability distribution of the sample mean for Random sample of size 2 drawn without replacement.

b) A Random sample of size 100 is taken from an infinite population having the mean μ = 76, and variance σ^2 = 256. What is the probability that $\bar{x}$ will be between 75 and 78

UNIT - IV

8) a) The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can one assert with 95% confidence about the maximum error if $\bar{x}$ = 11,795 and n = 50. Also construct 95% confidence interval for the true mean.

b) Measurements of the weights of a Random sample of 200 ball bearing made by a certain machine during One week showed a mean of 0.824 and standard deviation of 0.042. Find maximum error at 95% confidence interval? Find the confidence limits for the mean if x = 32.

OR

9) a) A sample of 400 items is taken from a population, whose standard deviation is 10. The mean of the Sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.

b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D. of 423 hours. A second sample of 17 bulbs, chosen from a different batch showed a mean life of 1280 hours with S.D. of 398 hours. Is there a significant difference between the means of two Batches?

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(DME 212)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - II : Mechanics of Materials

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 are temperature stresses? Explain.

b) Explain pure shears.

c) Explain point of contraflexure.

d) What is shear centre.

e) Explain strain energy and complementary energy.

UNIT - I

2) A steel bar 2.5cm diameter is rigidly attached to two parallel supports 8m apart. Find the full exerted by the bar on the support when the temperature is increased by 100ºC.

a) if the supports do not yield,

b) if yielding of both supports is 0.25cm. $\alpha_s = 12 \times 10^{-6}$ per ºC, $E_S = 210$ GPa.

OR

3) A steel specimen 1.5cm^2 in cross-section, stretches 0.005 cm over a 5cm gauge length under an axial load of 30 kN. Calculate strain energy stored in the specimen at this point. If the load at the elastic limit for the specimen is 50 kN, Calculate the elongation at elastic limit and the proof resilience.

UNIT - II

4) a) A hallow circular shaft, 12m long, is required to transmit 15MW when running at a speed of 300 r.p.m. If the maximum shearing stress allowed in the shaft is 80 MPa and the ratio of inner diameter to the outer diameter is 3/4 , find the dimension of the shaft and also the angle of twist of end of the shaft relative to the other. Modulus of rigidity of the material is 85 GPa.

b) Derive the torsion equation for a circular shaft of diameter 'd', subjected to torque 'T'

OR

5) a) A thin spherical shell 50cm in diameter, with a thickness 3mm, is full of water at atmospheric pressure (0.1 MPa). Find the intensity of radial pressure exerted on the wall of the shell if 30 C.C of water at atmospheric pressure is pumped in to the shell. Calculate the resulting hoop stress and the change in the volume of the sphere is modulus of elasticity of shell is E = 210 GPa, Poisson's ratio γ = 0.33 and bulk modulus of water is 2.361 GPa.

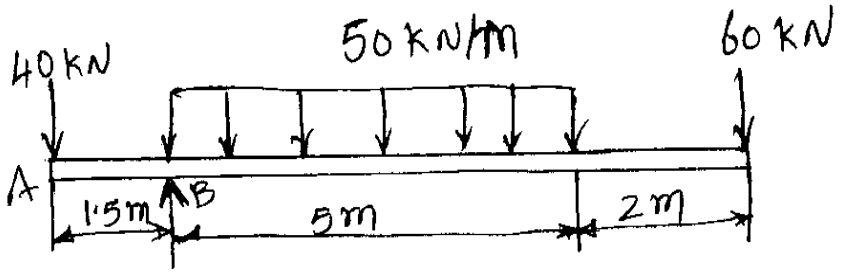
b) At a point in a material, there is a horizontal tensile stress of 270 MPa, a vertical tensile stress of 130 MPa and shearing stress of 40 MPa downward on left.

UNIT - III

6) The intensity of a loading on a simply supported beam of 5m span increases uniformly from 8kN/m at one end to 16 kN/m at the other end. Find the position and magnitude of the maximum bending moment. Also draw shear force and bending moment diagrams.

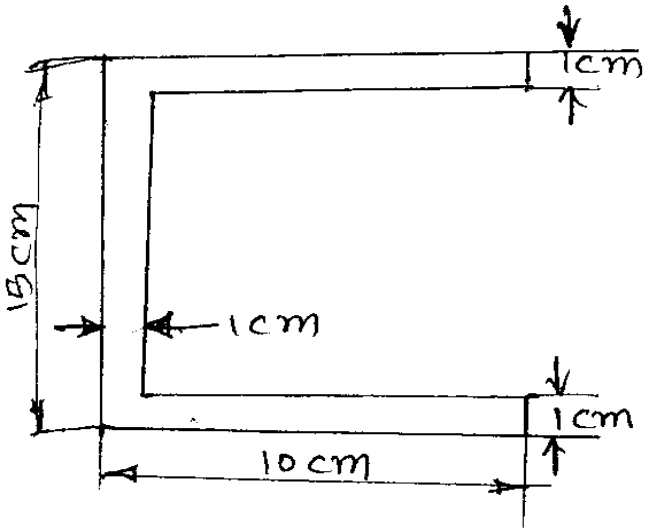
OR

7) Draw the shear force and bending moment diagrams for the beam shown in fig. below. Indicate the numerical values at all the important sections.



UNIT - IV

8) Determine the shear centre of the channel section shown in figure below:



OR

9) Two wooden planks 5cm × 15cm each are connected together to form a cross section of a beam shown in figure below. If a bending moment of 3400 N-m is applied around the horizontal neutral axis, find the stresses at the extreme fibres of the cross-section. Also calculate the total tensile force on the cross section.

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B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - III : Kinematics of Machines

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) Rigid and resistant bodies.

b) Kinematic pairs.

c) I-centre.

d) Stages of synthesis.

e) Types of followers.

f) Forms of teeth.

g) Law of Gearing.

UNIT - I

2) Define the following:

a) Kinematic pair.

b) Kinematic chain.

c) Kinematic Link.

d) Mechanism and

e) Structure.

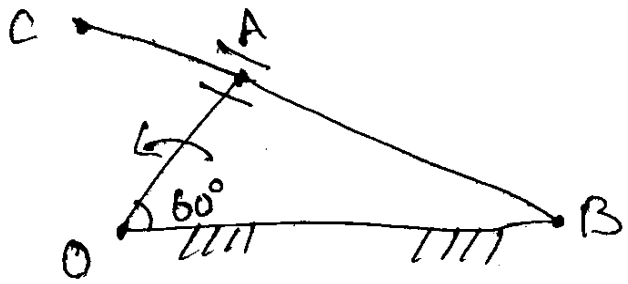
OR

3) In the Mechanism shown in figure. The crank OA makes 400 rpm in the counter clockwise direction. Find

a) Angular velocity of the link BA and

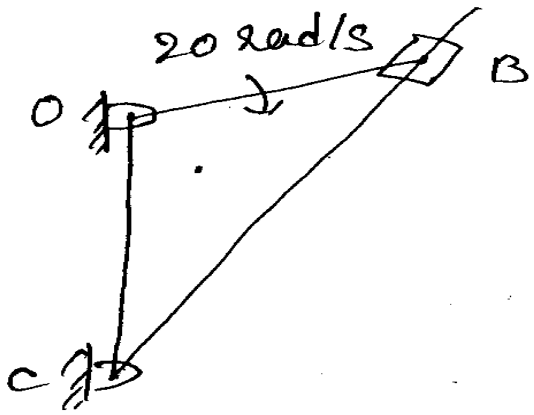
b) Velocity of the slider at A.

The lengths of the links are OA = 60mm, OB = 220 mm and BC = 300mm.



UNIT - II

4) Draw the acceleration diagram for the shaper mechanism shown in figure OB = 150mm CB = 225 mm, OC = 150 mm. Find the coriolis acceleration of the slider B.



OR

5) Derive the expression for Angular velocity using I-centre method.

UNIT - III

6) a) Explain the classification of synthesis.

b) Differentiate between Rigid body guidance and path generation.

OR

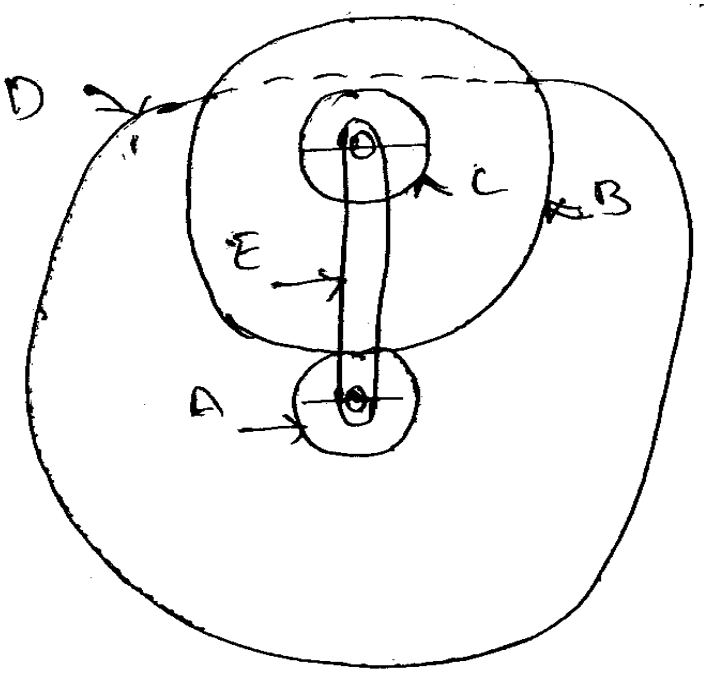
7) A cam rotating clockwise at auniform speed of 200 rpm is required to move an offset roller follower with auniform and equal acceleration and retardation on both the outward and return strokes. The angle of ascent, the angle of dwell (between ascent and descent) and the angle of descent is 120º, 60º and 90º respectively. The follower dwells for the rest of cam rotation. The least radius of the cam is 50mm, the lift of the follower is 25mm and the diameter of the roller is 10mm. The line of stroke of the follower is offset by 20mm from the axis of the cam. Draw the cam profile.

UNIT - IV

8) Two gear wheels of 100mm and 150mm pitch diameters have involve teeth of 3mm Module and an angle of obliquity of 17º. The addendum is each 3mm. Determine the number of pairs of teeth in contact.

OR

9) A epicyclic gear train for ahoist block is shown in Figure. The wheels A and B have 16 and 36 teeth respectively with a module of 3mm. The wheels C and D have a module of 4mm. Find the number of teeth on wheels C and D when the speed of A in ten times the speed of arm E, both rotating in the same sense and the wheel D is fixed.



(DME 214)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - IV : Fluid Machines

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:

a) Properties of fluid.

b) Simple monometer.

c) Irrotational flow.

d) Mouth pieces.

e) Darcy-weinbach equation.

UNIT - I

2) a) State and derive Newton's law of viscosity.

b) What are the modes of measuring pressure? How can you convert the pressure in KPa into the liquid columns and vice versa?

OR

3) What is the significance of viscosity and surface tension in fluid flow phenomenon? Explain in detail with required equations.

UNIT - II

4) a) Define and explain stream line, path line and streak line in fluid mechanics.

b) For the following flow find the equation of the streamline parsing through (1, 1), V = $3 \times i - 3yj$.

OR

5) a) State the Bernoulli's equation and discuss its significance.

b) A water pipe changes in diameter from 400mm at section A to 800mm at section B which is 7m above. The pressures at A and B are 100 KPa and 75 KPa respectively. The discharge is 400 litres/sec. Find the direction of flow.

UNIT - III

6) a) Explain the Reynold's experiment to classify the flows.

b) Derive Hazen Poiscille equation for laminar flow in circular pipe line.

OR

7) a) Derive the Darcy weisbach equation.

b) Two reservoirs are connected by a pipe line ABC which consists of two pipes of AB and BC is of 16cm diameter, 25m long and has f = 0.018. The junctions with the reservoirs and between the pipes are abrupt. What difference in water levels shall exist to maintain a discharge of 15 l/sec.

UNIT - IV

8) a) What do you understand by boundary layer? Explain the development of Boundary layer over aflat plate.

b) Define drag and lift. Explain how Boundary layer separation takes place.

OR

9) a) Explain mach number.

b) A venturimeter is used for measuring the flow of petrol in a pipe line inclined at 35ºto horizontal. The specific gravity of the petrol is 0.81 and throat area ratio is 4. If the difference in mercury levels in the gauges is 50mm.Calculate the flow if the pipe diameter is 0.3m. Take coefficient of discharge as 0.975.

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(DME 215)

B.Tech. DEGREE EXAMINATION, DECEMBER - 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - V : Basic Thermodynamics

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

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

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

1) a) Define the term thermal engineering.

b) When a system is said to be in "Thermodynamic equilibrium"?

c) State first law of thermodynamics and give any two corollaries?

d) What is meant by reversible and irreversible process?

e) Define the term entropy?

f) What are the limitations of first law of thermodynamics?

g) State phase rule of pure substances?

UNIT –I

2) a) What are the different types of thermodynamic systems? Explain with examples.

b) Work done by a substance in a reversible non-flow manner is in accordance with = $\left(\frac{150}{p}\right)$ m^3, where p is in bar. Evaluate the work done on or by the system as pressure increases from 10 to 100 bar. Indicate whether it is compression or expansion process.

OR

3) a) Differentiate between macroscopic and microscopic view points from the thermodynamics.

b) A vertical cylinder containing argon gas is fitted with a frictionless leak poof piston of mass 45 kg and a cross sectional area of 0.35 m^2. The atmospheric pressure is 100 kPa and the local acceleration due to gravity is 9.81 m/s^2. What is the argon pressure inside the cylinder?

UNIT –II

4) a) What are the major limitations of first law of thermodynamics? Explain how to overcome these limitations.

b) A closed system under goes a thermodynamic cycle consisting of four separate and distinct processes. The heat and work transferred in each process are as tabulated below.

Processes	Heat transfer in kJ /min	Work transfer in kJ /min
1-2	22,500	0
2-3	-9,400	29,500
3-4	0	19,500
4-1	19,750	-24,500

Show that the data is consistent with the first law of thermodynamics. Also evaluate the net work output in kW and the change in internal energy.

OR

5) a) Derive the steady flow energy equations for steam turbine and rotary compressor.

b) The gas leaving the turbine jet engine flows steadily into the jet pipe with enthalpy 800 kJ/ kg and velocity 123m/s. The exit from the pipe is at enthalpy 450 kJ/kg. And exhaust is in line with intake. Neglecting heat loss from the system, determine the velocity of gas leaving the pipe.

UNIT –III

6) a) State the statements of the second law of thermodynamics.

b) Determine the power required to run a refrigerator that transfers 1500kJ/min of heat from a cooled space at 10°C to the surrounding atmosphere at 32°C. And also calculate the maximum work and irreversibility.

OR

7) a) State and prove the claussius inequality from second law of Thermodynamics.

b) A direct heat engine A and a reversed heat engine B operate between 179°C and 28°C. The COP of B as a heat pump is 3.5. Engine A drives the engine B. The magnitudes of heat interaction of A and B with the reservoir at 27°C are 200 and 110kJ respectively. The combine work output of A and B as 24kJ. Identify whether the heat engine A is reversible or irreversible.

UNIT –IV

8) a) What are the advantages associated with the diesel cycle as compared to the otto cycle?

b) A gas engine working on otto cycle has a cylinder of diameter 220 mm and stroke 300 mm. The clearance volume is 1800cc. Find the air-standard efficiency. Assume Cp = 1.004 kJ/kg. K and Cv=0.718 kJ/kg. K for air.

OR

9) a) Draw the schematic diagram along p-h and T-S diagrams of vapour compression refrigeration system and explain the working principle.

b) A steam power plant operates on a simple ideal Rankine cycle the steam enters theturbine at 3MPa and 350°C and exits at 5 kPa. Determine the net work done per kg of steam and the thermal efficiency of the cycle.

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(DME 216)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper – VI : Material Science & Metallurgy

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

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

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

1) Write short notes on:

a) Why are F.C.C metals more ductile than B.C.C metals.

b) Explain the Gibb's phase rule.

c) List the features of high carbon steels.

d) Define hardenability.

e) What are ceramic magnets.

f) List out the methods of manufacturing metal powders.

g) What is composite?

UNIT - I

2) Write short notes on:

a) Types of crystal imperfections with the help of sketches.

b) Explain the equilibrium diagram of isomorphous alloy.

OR

3) a) What is unit cell. Draw the unit cells of simple BCC and FCC cells. Copper has an atomic radius of 0.128. Find the volume of unit cell of copper.

b) Draw the phase diagram of Eutectic system showing the eutectic point at 70% A and 30%B and explain the eutectic process.

UNIT - II

4) a) Give the chemical composition and microstructure of nodular cast iron. Explain the manufacturing process of nodular cast iron.

b) What is the effect of alloying elements on eutectoid temperature and composition? What happens to the austenite phase with addition of alloying elements? Explain with sketches.

OR

5) a) Explain the construction of T.T.T curves.

b) What are the objectives of heat treatment of metals? Distinguish between full annealing and process annealing

UNIT - III

6) a) Contrast mechanical and hydraulic compacting presses with regard to advantages, disadvantages and applications.

b) What is a composite? Discuss briefly the different types of composites.

OR

7) a) Draw a typical creep curve and explain different stages of creep.

b) Explain the cyaniding process and list its advantages, limitations and applications.

UNIT - IV

8) a) Describe briefly, the sequence of operations involved in making powder metallurgical component.

b) What are bronzes? How are they classified? Give the composition micro structure, properties and applications of any three of them.

OR

9) a) What are the outstanding applications of copper and its alloys.

b) Explain in detail about sintering.

(DME 217)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - VII : Machine Drawing

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

Answer one question from each unit

All questions carry equal marks

UNIT - I

1) Draw multi start threads.

OR

2) Draw the eyebolt with suitable dimensions.

UNIT - II

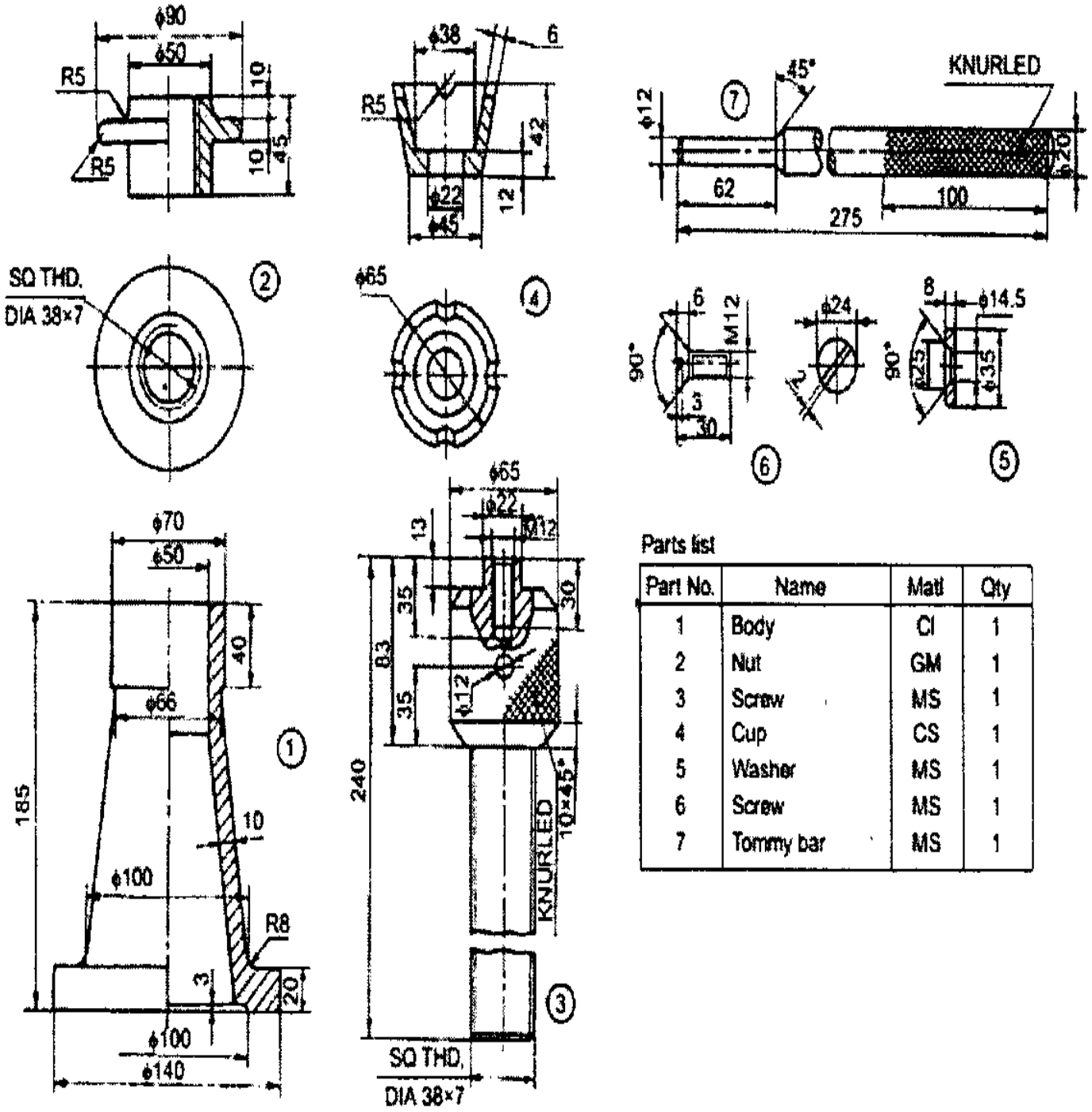
3) Draw socket and spigot cotter joint for two shafts of 30 mm diameter.

OR

4) Draw the split muff coupling to join shafts of 30 mm diameter.

UNIT - III

5) Assemble all parts of Screw jack. Draw the assembled views.

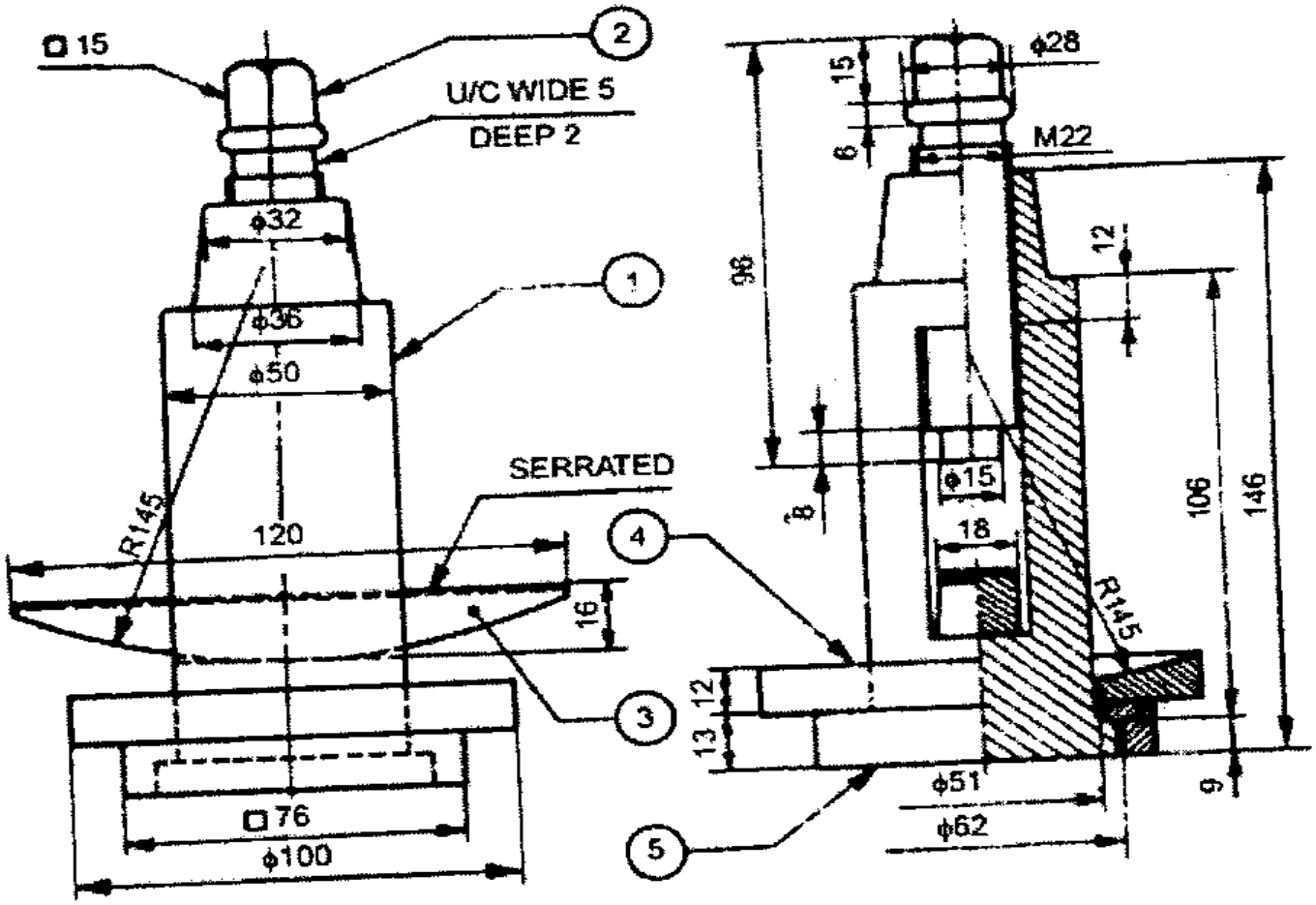


Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

OR

6) Prepare the part drawing by giving two views of the following Single tool post.



Parts list

Part No.	Name	Matl.	Qty.
1	Body	MS	1
2	Clamp screw	MCS	1
3	Wedge	CI	1
4	Ring	MS	1
5	Square block	MS	1

(DME 221)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - I : Engineering Mathematics-IV

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 are possible solutions of wave equation.

b) What are Laplace's equations in two dimensions and three dimensions.

c) Evaluate $\int_c \frac{z^2-z+1}{z-1}dx$, where C is the circle |z| = 1.

d) If w = log z then find $\frac{dw}{dz}$

e) Find Taylor series expansion of $f(z) = \frac{1}{(z+1)^2}$ about z = -i.

f) Find the nature and location of the singularities of $f(z) = \frac{1}{\cos z - \sin z}$.

g) Find Taylor's series expansion of sinz about $z = \frac{\Pi}{4}$.

h) Find the image of |z+1| =1 under the mapping w = $\frac{1}{z}$.

UNIT - I

2) A tightly stretched flexible string has its ends fixed at $x = 0$ and $x = l$. At time t=0, the string is given a shape defined by $f(x) = \mu\, x\,(1 - x)$, where μ is constant, and then released. Find the displacement of any point x, of the string at any time t > 0.

OR

3) Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

UNIT - II

4) a) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though C.R equations are satisfied.

b) Find analytic function $f(z) = u(r,\theta) + iv(r,\theta)$ such that $v(r,\theta) = r^2\, cos2\theta - rcos\theta + 2$.

OR

5) a) Evaluate $\int_c (z^2 + 3z + 2)dz$, where C is the arc of the cycloid $x = a(\theta + sin\theta), y = a(1 - cos\theta)$ between the points (0,0) and $(\pi a, 2a)$.

b) Using Cauchy's Integral formula Evaluate $\oint_c \frac{z}{z^2-3z+2} dz$, where C is |z-2|=$\frac{1}{2}$

UNIT - III

6) a) Find the Laurent's expansion of $f(z) = \frac{7z-2}{(z+1)z(z-2)}$ in the region 1<z+1<3.

b) Determine the poles of the function $\frac{z^2}{(z-1)^2(z+2)}$ and the Residue at each pole.

OR

7) Evaluate $\int_0^\infty \frac{cos\, ax}{x^2+1} dx$.

UNIT - IV

8) a) Discuss the transformation $w = \sqrt{z}$. Is it conformal at the origin.

b) State and prove Poisson integral formula.

OR

9) a) Show that the transformation effected by an analytic function $w = f(z)$ is conformal at every point of the z-plane where $f'(z) \neq 0$.

b) Show that under the transformation $w = \frac{z-i}{z+i}$, real axis in the z-plane is mapped into the circle |w|=1, which portion of the z-plane corresponds to the interior of the circle.

(DME 222)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper – II : Advanced Mechanics of Materials

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

Answer question No.1 is compulsory ***(5×3 = 15)***

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

1) a) Give the limitations of Euler's formula.

b) Write the equation of stress for a curved bar subjected to bending moment.

c) State the assumptions in Lame's Theory.

d) Explain statically Indeterminate beams.

e) Explain the principles of virtual work.

UNIT - I

2) a) What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of the beam.

b) A cantilever of uniform cross section of length '*l*' carries two point loads, W at the free end and 2W at a distance *a* from the free end. Find the maximum deflection due to this loading.

OR

3) A tubular steel strut is 6.5 cm external diameter and 5 cm internal diameter. It is 2.5 cm long and has hinged ends. The load is parallel to the axis but eccentric. Find the maximum eccentricity for a crippling load of 0.75 of the Euler value, the yield stress being 320 MPa. E = 210 GPa.

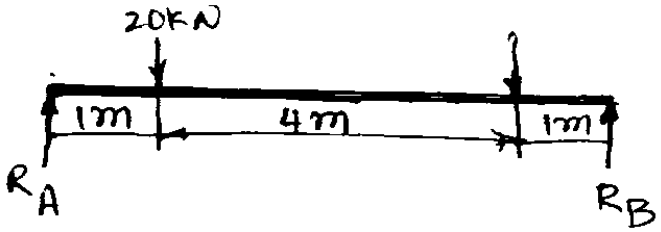
UNIT - II

4) a) A cantilever of span 4m carries a udl of 3kN/m from free end to the mid point of the beam. Calculate the slope and deflection at the free end by moment area method.

b) A simply supported steel beam having a uniform cross section is14m span and is simply supported at its ends. It carries a concentrated load of 120 kN and 80 kN at two points 3m and 9.5 m from left end respectively. If the moment of inertia of the section is 160 x 10^7 mm^4 and E = 210 GPa. Calculate the deflection of the beam at loaded points.

OR

5) Calculate the deflection at the centre for the beam shown in figure below. E = 200 GPa, I = 2000 cm^4.

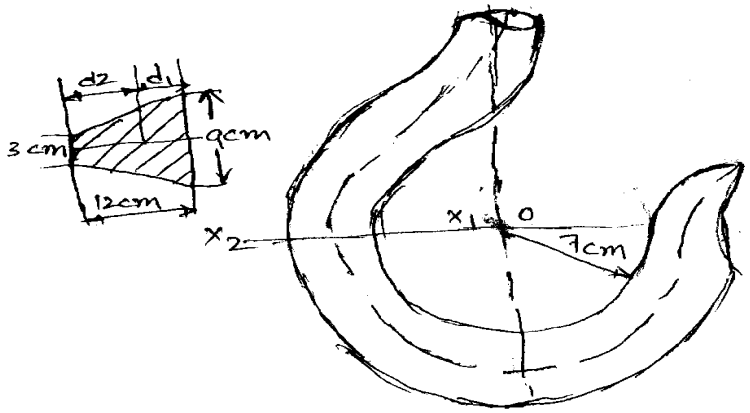


UNIT - III

6) A compound cylinder is formed by shrinking one cylinder on to another. The final dimensions are: internal dia. = 15cm, external dia. = 30cm and dia. at junction = 25cm. The shrinkage pressure is 10 MPa. Calculate the shrinkage allowance. What is the minimum temperature to which the outer cylinder must be heated so that it can be slipped down. Coefficient of linear expansion, α= 0.6 x 10^{-5} per ^oC. E = 200 GPa.

OR

7) The dimensions of 100kN crane hook are shown in figure.



Determine the stresses at the inside and outside fibres of the hook on a horizontal diameter passing through the centre of curvature.

UNIT - IV

8) A disc of 50 cm diameter and uniform thickness is rotating at 2400 r.p.m. Determine the maximum stress induced in the disc. If a hole of 10cm diameter is drilled at the centre of the disc, determine the maximum intensities of radial and hoop stresses induced. Take $\gamma = 0.28$ and density of the disc = 7800 kg/m^3.

OR

9) A steam turbine rotor is 15 cm diameter below the blade ring and 2 cm thick. The turbine is running at 36000 r.p.m. The allowable stress is 150 MPa. What is the thickness of the rotor at a radius of 5 cm, and at the centre. Assume uniform strength and take density of the material = 7800 kg/m^3.

EEE

(DME 223)

B. Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - III: Electrical Technology

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 Kirchoff's current Law.

b) What is resonance?

c) Define pole-pitch.

d) What are the functions of pole shoes?

e) How do you eliminate eddy current losses?

f) What is form factor?

g) What parameters can be obtained from S.C test?

h) Why single phase induction motor is not self starting?

i) Give any two applications of synchronous motor.

j) What are the two types of moving iron instruments?

k) What is precision?

l) What are the various torques required for operating an instrument?

m) Write the expression for efficiency in a transformer.

n) Draw the circuit diagram of compound generator.

o) What are the advantages of dynamometer type wattmeter?

UNIT - I

2) a) A series RLC circuit is to have a resonant frequency of 10,000 radians per second and a bandwidth of 500 rad/sec. The impedance at resonance is to be 200 ohms. Determine the value of resistance, inductance and capacitance required.

b) Discuss about 3 –ϕ balanced circuits in detail.

OR

3) a) Draw the external characteristic of a series generator. Why does the terminal voltage start decreasing after a certain value of load current.

b) What is a compound generator? Differentiate between over, level and differential compounding. Draw external characteristics of the generators.

UNIT - II

4) a) List the various losses that occur in a D.C machine and state how they vary with the load in case of a shunt motor.

b) A 250V shunt motor has an armature resistance of 0.2 ohm and a shunt field resistance of 125 ohms. If the stray losses amount to 780 W, find the output at which maximum efficiency occurs and also the maximum efficiency.

OR

5) Describe the method of calculating the regulation and efficiency of a single phase transformer by open circuit and short circuit tests.

UNIT - III

6) a) Show that a rotating magnetic field can be produced by the use of 3-phase currents of equal magnitude.

b) A 6 - pole, 3 -ϕ, 50 Hz induction motor develops maximum torque of 200 Nm at a speed of 960 rpm. Determine the torque exerted by the motor at 5% slip the rotor resistance per phase is 0.5Ω.

OR

7) a) Derive the emf equation of an alternator.

b) List out the applications of synchronous motors.

UNIT - IV

8) Describe the principle and operation of two types of Moving Iron instruments in detail.

OR

9) a) Draw and discuss speed time characteristics in detail.

b) Discuss the principles of electric traction in detail.

EEE

(DME 224)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - IV : Computer Based Numerical Methods

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:

a) Bisection method

b) Finite differences

c) Bessel's interpolation

d) Linear difference

e) Picard's method

UNIT - I

2) Explain finite differences in detail.

OR

3) a) Find the root of the equation $\cos x = xe^x$ using the regula-falsi method correct to four decimal places.

b) Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method correct to three decimal places.

UNIT - II

4) Explain Gregory – Newton forward interpolation formula and equidistant terms with one or more missing values.

OR

5) Calculate the value of f(1.5) using Bessel's interpolation formula, from the following table.

x:	0	1	2	3
f(x):	3	6	12	15

UNIT - III

6) Explain Newton's forward and backward differences to compute derivatives.

OR

7) Explain

a) Trapezoidal rule

b) Simpson's 1/3 Rule

UNIT - IV

8) Explain Taylor series and Euler's rule/method in detail.

OR

9) Describe Numerical solutions of partial differential equations.

EEE

(DME 225)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper – V : Applied Thermodynamics

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

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

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

1) a) Advantages of regenerative cycle.

b) List the different mountings of boiler.

c) Advantages of impulse turbine.

d) Different types of turbines.

e) What is compression ratio?

f) Define the term COP.

g) Define DPT and degree of saturation.

UNIT - I

2) Explain with the help of neat diagram a 'Regenerative cycle'. Derive an expression for its thermal efficiency.

OR

3) a) Give the comparison between 'firetube' and 'water tube' boilers.

b) What is the function of boiler mountings? Can a boiler work without mountings? Mention four important mountings of a boiler.

UNIT - II

4) a) What is the effect of friction on the flow through a steam nozzle? Explain with the help of h-s diagram.

b) In a steam nozzle steam expands from 4 bar to 1bar. The initial velocity is 60m/s and the initial temp. is 200^{o}C. Determine exit velocity if the nozzle efficiency is 92%.

OR

5) Explain with the help of neat diagram a single stage impulse turbine. Also explain the pressure and velocity variation along the axial direction.

UNIT - III

6) A steam turbine discharge 5500 kg of steam per hour at 35^{o}C and a dryness fraction of 0.9. The air leakage is estimated to be 18 kg/hr. At the section of air pump, temperature is 32^{o}C and the temperature of condensate is 30^{o}C. Find

a) The vacuum gauge reading

b) Capacity of air pump

c) Loss of condensate in kg/hr

d) The quantity of cooling water required if the rise in the temperature of cooling water is limited to 10^{o}C.

OR

7) a) What are different types of losses associated with the centrifugal compressor? Explain them.

b) A centrifugal air compressor having internal and external diameters of 200mm and 400mm respectively compresses 25kg of air per minute while running at 4500rpm. The vane angles at inlet and outlet are 30^{o} and 40^{o} respectively. Find the necessary thickness of the blade, if the impeller contains 35 blades. Take specific volume air as 0.85 m^{3}/kg.

UNIT - IV

8) a) Draw the schematic, P- V and T-S diagram of Bell coleman cycle and explain its working principle.

b) The temperature range in freon 12 plant is -283K to 315K. The compression is isentropic and there is no cooling of the liquid. Find cop assuming that the refrigerant.

i) after compression is dry saturated.

ii) leaving the evaporator is dry saturated.

OR

9) a) How the specific enthalpy of moist air is estimated? Define the terms dry bulb temperature, wet bulb temperature and dew point temperature.

b) Why air conditioning system is required in summer? Explain the method to control humidity in summer air condition system.

EEE

(DME 226)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year Second Semester)

MECHANICAL ENGINEERING

Paper - VI : Casting Forming and Welding Technology

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) List types of castings.

b) Moulding materials.

c) Advantages of core.

d) Shrinkage Allowances.

e) What is Runner and Raiser?

f) Seam welding.

g) What is importance of edge preparation in welding?

h) List different weld positions.

i) Fire Prevention.

j) Soldering.

k) Swaging.

l) Blanking.

m) Sheet Metal Tools.

n) Defects in sheet metal operation.

o) List the products produced by sheet metal process.

UNIT - I

2) a) Explain the different sand properties required for moulding.

b) Define casting. Explain the advantages over other manufacturing processes.

OR

3) Explain the Safety Precautions while working in casting shop.

UNIT - II

4) With neat sketch explain Permanent die-casting.

OR

5) Explain various casting defects with causes, testing and remedies.

UNIT - III

6) a) Explain the oxy-acetylene welding.

b) Explain the processes of laser beam welding.

OR

7) a) Write a short note on:

i) Brazing ii) Soldering

b) Explain the welding defects with causes and remedies.

UNIT - IV

8) a) List the differences between hot and cold working.

b) What is rolling? Explain any two rolling stand arrangements

OR

9) Explain briefly about sheet metal components?

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(DEC / DME / DCE 227)

B.Tech. DEGREE EXAMINATION, DECEMBER – 2015

(Examination at the end of Second Year)

ELEC & COMMU and MECHANICAL and CIVIL ENGINEERING

Paper – VII : Environmental Science

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

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

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

1) Write briefly on:

a) Composting.

b) Global Warming.

c) Nuclear Reactor at Nagarjuna Sagar

d) Kolleru lake –aquaculture in AP

e) Wet Lands

f) Water shed management

g) Nuclear Hazards

h) Cloud Seeding.

i) Water logging

j) Indoor Airpollution

k) Flood

l) Soil Erosion

m) Hot Spots.

n) Thermal pollution

o) Salinity.

UNIT - I

2) Discuss about present environmental issues on global concern.

OR

3) a) Define renewable and non renewable resources.

b) Discuss about the energy resources.

UNIT - II

4) Discuss causes, effects and control measures of water pollution.

OR

5) Discuss about the

a) Resettlement and rehabilitation of people.

b) Urban problems related to energy.

UNIT - III

6) Write a detailed explanation about local polluted site of your choice.

OR

7) What is 'Sustainable Development'? Discuss the concept of Sustainable Development.

UNIT - IV

8) Discuss about the air and water prevention and control of protection act.

OR

9) Discuss the salient features of the Environment Act, 1986.