P.P- I / Sem III / MECH + AUTO / CBGS / 09/12/15

Nov-Dec-15

Mech

AUTO

Sub :- PP-I

QP Code : **5199**

(3 Hours) [ Total Marks : 80

N.B. : (1) Question no. **1** is **compulsory**
(2) Attempt **any three** questions out of remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data wherever necessary.
(5) Notations carry usual meaning.



1. (a) Explain various welding defects with their causes and remedies. 10
   (b) Differentiate between soldering and brazing. 5
   (c) Compare transfer molding and compression molding. 5

2. (a) A cylindrical riser is to be designed for a sand casting mould. The size of steel casting is 7.5 cmx 12.5 em X 2cm. The previous observation have indicated that the total solidification time for casting is 96 sec. 10
   The cylinder riser have ( d/h) =I. Find the size of riser so that its solidification Time is 120 sec.
   (b) Discuss friction welding with its applications. 5
   (c) Differentiate between open and closed die forging. 5

3. (a) Discuss various rolling defects. 6
   (b) Differentiate between core and core print. 6
   (c) With a neat sketch explain resistance welding process giving its applications 8

4. (a) Write advantages and dis advantages of powder metallurgy. 6
   (b) With a neat sketch explain swaging process. 6
   (c) What are the different NTD methods? Explain any two methods in detail. 8

5. (a) Explain the screw type injection moulding with neat sketch .Discuss its advantages, limitations and applications. 8
   (b) Discuss different methods of making powder in powder Metallurgy 6
   (c) Explain different gas welding equipments 6

6 Write short note on 20
   (i) Pattern allowances
   (ii) Casting defects
   (iii) Thermit welding
   (iv) Thread rolling

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P.P. I / Auto (old) / Sem III (old) / 09/12/15

Nov-Dec-15

AUTO Sub:- PP-I

QP Code : **1180**



( 3 Hours) [ Total Marks : 100

N.B.: (1) Question **No.1** is **compulsory**
(2) Attempt any **four** questions out of remaining six questions
(3) Figures to **right** indicate **full** marks
(4) Assume suitable data if necessary.

1. Write short note on following- **(Any four)** 20
   (i) Properties of moulding sand
   (ii) Types of flames in gas welding
   (iii) Centreless grinding
   (iv) Radiography method of NDT
   (v) Up milling and down milling

2. (a) Draw neat sketch of radial drilling machine. Explain the varios important parts with their functions. 10
   (b) Sketch the following milling operations
   (1) form milling
   (2) face milling
   (3) spur gear milling
   (4) T-slot milling

3. (a) Disuss electroslag welding with neat sketch. State is applications and limitations. 10
   (b) Explain any Ten casting defects with their remedies. 10

4. (a) State various methods of Taper turning operation on lathe machine. Discuss in detail any one method with neat sketch. 10
   (b) Explain the following terms w.r.t. grinding wheel. 10
   (i) Grit (ii) Grade
   (iii) Structure (iv) Bond

5. (a) Explain with a neat sketch working of friction welding process. 5
   (b) Explain the importance of risers in casting process. 5
   (c) Compare EDM and ECM with reference to 10
   (1) Surface finish
   (2) Power consumption
   (3) Material removal rate
   (4) Power supply

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6. (a) Explain the process of poweder metallurgy with advantages and limitations. 10
   (b) Write composition, properties and applications of 10
   (i) White cast Iron
   (ii) Nodular cast Iron
   (iii) Stainless steel

7. (a) List various NDT methods. Explain the ultrasonic inspection method with neat sketch and discuss its advantages over other techinques. 10
   (b) Compair constructional features of Shaper and planner. 5
   (c) Explain Gear hobbing. 5

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T.E (Sem V) P.P-III 07/12/15

Mech & Auto (CBGS) Nov-Dec-15

Mech
AUTO

Sub:- PP-III

**QP Code : 5681**

**Duration 3Hrs** **Max. Marks: 100**

**Instructions:**

(1) Question No.1 is compulsory and Answer 3 Questions remaining 5 Questions.
(2) Assume suitable data wherever necessary
(3) Concepts explanation with suitable case study justification
(4) Diagram and sketches explanations are right to reserve full marks



| | | |
|---|---|---|
| **Q1** | **Answer Any Four Questions** | |
| | 1. Integration of process and Product development system | 20 |
| | 2. Classification of various press tool machines with line sketches | |
| | 3. Write short note on Ultra Sonic Machining **(USM)** | |
| | 4. Explain Scrap strip Layout | |
| | 5. Define Jigs and Fixtures | |
| Q2 | 1. Explain Transfer machine machines used in industry? | 10 |
| | 2. Explain various sheet metals production process with neat sketches. | 10 |
| Q3 | 1. Explain the following with neat sketches i) Locators ii) Clamping Devices (Any Two Each) | 10 |
| | 2. Explain the general arrangement of Injection plastic molding process | 10 |
| Q4 | 1. Tabulate classification of non-traditional manufacturing processes & Explain Electron Beam Machining (EBM) | 10 |
| | 2. Explain Flexible Manufacturing System (FMS) | 10 |
| Q5 | 1. Explain principle, construction, working, applications, advantageous and limitations of Abrasive Jet Machining (AJM) | 10 |
| | 2. Draw an economical strip layout and find out percentage utilization of material of square product. Thickness of sheet metal 1 mm (Assume side of the product is 25mm) | 10 |
| Q6 | **Answer Any Two Questions** | 20 |
| | 1. Explain principle, construction, working, applications, advantageous and limitations of Electro chemical Machining **(ECM)** | |
| | 2. Agile Manufacturing System principles, procedures, implementation in Production Process | |
| | 3. Write short note on (i) Die and Punch of press tool design with neat sketches (ii) 3-2-1 Principle of Locators with neat sketches | |

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SE SEM (III) (Old) MECH (Old) : SOM
MECH (OTR)
AUTO (Old)

03/12/15

Nov-Dec 15

Mech
AUTO

Sub: SOM

3/12/15

**(OLD COURSE)** **QP Code : 1139**

**(3 Hours)** **[Total Marks : 100**

N. B. 1) Question No. 1 is compulsory.
2) Attempt any four questions from remaining six questions
3) Assume suitable data if required

1. Answer any four of the following [4x5=20]

a) Define Poisson's ratio, Bulk modulus. Write the relationship among the elastic constants.

b) Define columns and struts. What are the assumptions made in Euler's theory of columns?

c) Derive an expression for strain energy stored in shear.

d) Derive torsion formula.

e) A material has Young's Modulus of $2 \times 10^5$ N/mm$^2$ and Poison's ratio of 0.32. Calculate the Modulus of Rigidity and Bulk Modulus of material.

f) derive flexural equation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ with usual notations

2 (a) A simply supported beam of 8 m span carries a U.D.L. over the entire span. If the maximum permissible bending stress in tension is 30 MN/m$^2$ and in compression is 45 MN/m$^2$. Find the U.D.L. intensity and the bending stresses. The cross section is I – Section with, Top flange 100 x 30; Web 30 x 120; Bottom flange 120 x 50 (all dimensions in mm). [10]

(b) A hollow cylindrical column is fixed at both ends. The length of the column is 4 m and carries an axial load of 250 KN. Design the column by Rankine's formula. Take F.O.S.= 5.The internal diameter may be taken as 0.8 times the external diameter. Take $\sigma_c$=550 N/mm$^2$ and $\alpha$=1/1600 in Rankine's formula [10]



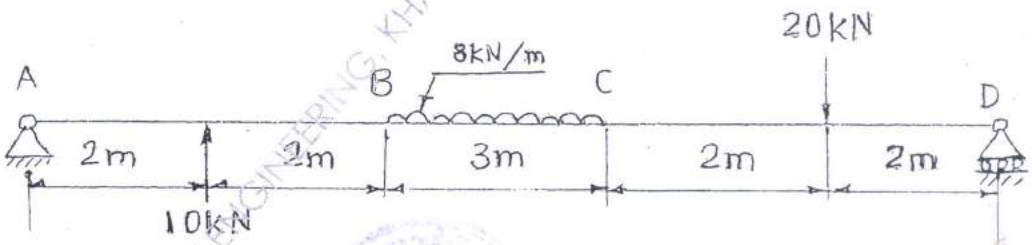
**[TURN OVER**

3. (a) A symmetrical I-section with flanges 250mm x 20 mm has a web160 mm X 10 mm. If the shear force acting on the section is 80 KN, find maximum shear stress developed in the section and draw shear stress distribution diagram. [10]

(b) A closed cylindrical vessel made of steel plates 6 mm thick with plane ends carries fluid under a pressure of 6 $N/mm^2$. The diameter of the cylinder is 210 mm and the length is 750 mm. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the changes in diameter, length and volume of the cylinder. Take 1/m = 0.35 and E= 2.1 X $10^5$ $N/mm^2$ [10]

4 (a) Find the maximum and minimum stress intensities at the base of a uniform circular chimney, having external and internal diameters as 5m and 3m. The height of the chimney is 25m and it is subjected to wind pressure of 1.5 $kN/m^2$ . The density of masonry may be taken as 21 $kN/m^3$. [10]

(b) Determine the deflection at B and slope D for a simply supported beam shown in the Fig. and also find the maximum deflection and its location. Take E = 2 x $10^5$ $N/mm^2$, I = 300 x $10^8$ $mm^4$ [10]

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5. (a) A steel bar is placed between two copper bars each having the same area and length as steel bar at $25^0$. At this stage they are rigidly connected together at both ends. When the temperature is raised to $325^0$C then the length of the bars is increased by 1.5mm. Determine the original length and final stresses in the bar.

$E_{ST} = 2.1 \times 10^5$ N/mm$^2$; $E_{CU} = 1 \times 10^5$ N/mm$^2$;

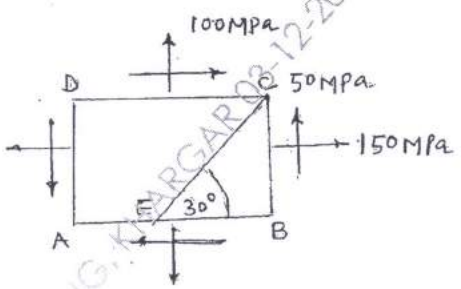
$\alpha_{ST} = 12 \times 10^{-6} / {}^0$C; $\alpha_{CU} = 17.5 \times 10^{-6} / {}^0$C [10]

(b) Determine the diameter of a solid shaft, which will transmit 300 KW at 250 rpm. The maximum shear stress should not exceed 30 N/mm$^2$ and twist should not be more than $1^0$ in a shaft of length 2 m. Take modulus of rigidity = $1 \times 10^5$ N/mm$^2$ [10]

6 (a) A plane element is subjected to the stresses as shown in figure. [10]

(i) Determine the principle stresses and their planes

(ii) The magnitude and directions of the maximum shear stresses.



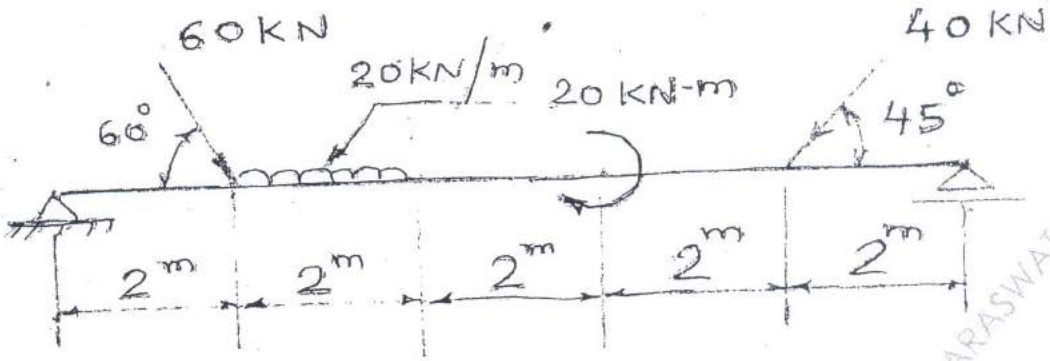



(b) A tube of aluminium 40 mm external diameter and 20 mm internal diameter is fitted on a solid steel rod of 20 mm diameter. The composite bar is loaded in compression by an axial load P. Find the stress in aluminum, when the load is such that the stress in steel is 70 N/mm$^2$, also find the value of P.

$E_S = 2 \times 10^5$ N/mm$^2$ and $E_{Al} = 7 \times 10^4$ N/mm$^2$ [10]

**[TURN OVER**

7(a) For the beam shown below, draw S.F, BM and AF diagrams. [10]




(b) An unknown weight falls through 8 mm on a collar rigidly attached to the lower end of a solid vertical bar, 4m long and 40 mm x 20 mm in section. If the maximum instantaneous extension is known to be 3 mm, what is the corresponding stress and the value of the unknown weight. Take $E = 2 \times 10^5$ N/mm$^2$ [10]

Nov-Dec-15

SE SEM III (CBGS) - MECH / AUTO - SOM

3/12/15

Mech / AUTO

Sub:- SOM

Q.P. Code : **5150**

(3 Hours) | Total Marks : 80

N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **three** questions frome the remaining **five** questions.
(3) Assume suitable **data** wherever **necesssary**.
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt Any **FIVE**. 20

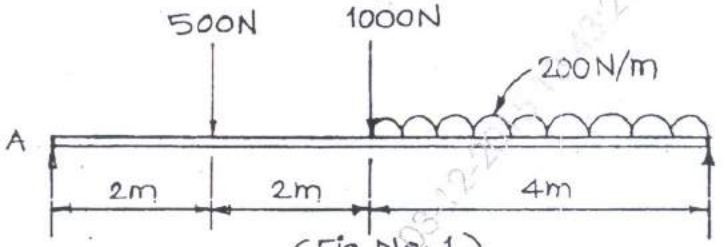
(a) Draw Stress- Strain curve for ductile material & explain salient points on it.

(b) What are the assumptions made in simple bending. Derive flexural formula.

(c) A steel spherical shell of radius 600 mm has a wall thickness of 6 mm. Determine maximum stress caused due to internal pressure of 0.8 N/mm2. Take, E= 210 GPa and Poisson's ratio as 0.3

(d) A hollow circular shaft of 80 mm internal diameter and 150 mm external diameter is subjected to a torque of 70 kN-m. Find maximum shear stress developed.

(e) Draw shear force and bending moment diagram for the beam shown in fig. no.1

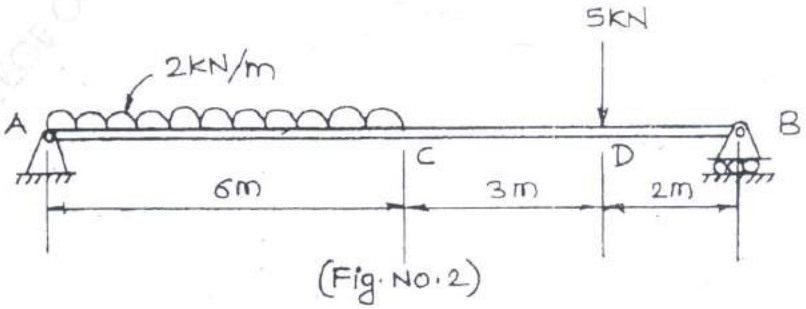


(Fig. No. 1)



(f) Determine the section of C.I. hollow cylindrical column 6 m long with ends firmly fixed. The ratio of external to internal diameter is 1.3 and carries an axial load of 500 KN. Use factor of safety as 6. Take $\sigma_c$=500 N/mm2 and Rankine's Constant, $\alpha = 1/1600$.

2. (a) Find slope at point A & B, deflections at points C & D for a beam as shown in fig. no 2. Also find the maximum deflection. Take, E = 200 GPa & I = $1 \times 10^8$ mm$^4$ 10



(Fig. No. 2)

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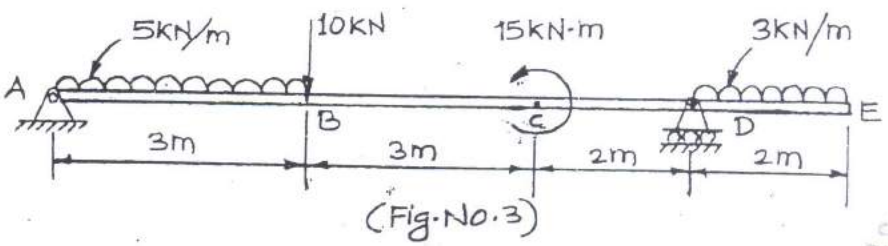
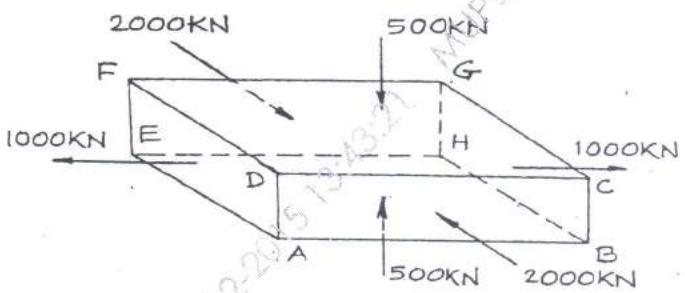
(b) Draw SFD and BMD for the beam shown in fig. no 3.



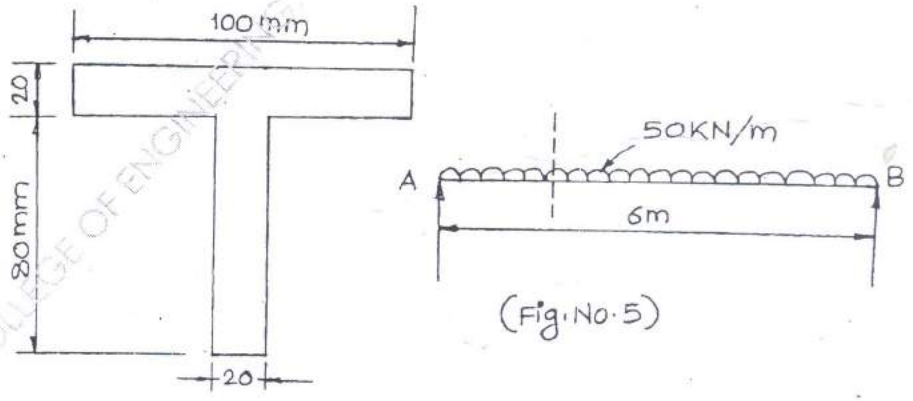

(Fig.No.3)

3. (a) A rectangular block is loaded as shown in fig. no 4. Find the change in dimensions and also change in its volume.
Take, Poisson's Ratio= 0.3
E = 210 GPa
AB =400mm
BC= 120mm
AE=250mm




(Fig. No. 4)

(b) A 6m long simply supported beam AB, loaded with u.d.l. of 50 KN/m over entire span as shown in fig. no. 5. Find shear force and bending moment magnitude to be resisted at a section 1.4 m from end A Draw shear force distribution diagram.




(Fig.No.5)

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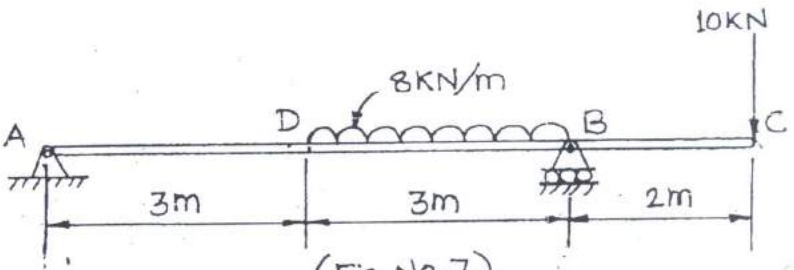
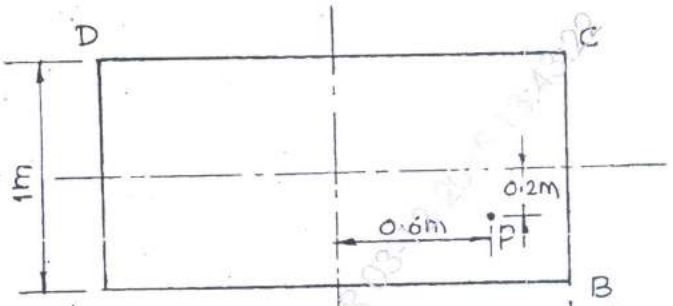
6. (a) Determine deflection at the free end 'C' for the beam shown in fig. no·7. Take, E = 200 GPa and I= 15 x $10^{-6}$ $m^4$.




(Fig. No·7)

(b) A vertical column of rectangular section is subjected to a compressive load of P=800 KN as shown in fig. no. 8. Find the stress intensities at the four comers of the column.




(Fig·No·8)

(c) A steel rod 5m long and 20 mm in diameter is subjected to an axial tensile force of 1000 KN. Find the changes in length, diameter and volume of the rod. Take, E = 210 GPa and poisson's ratio of 0.3

5. (a) Find analytic function whose real part is

$$\frac{\sin 2x}{\cosh 2y + \cos 2x}$$

(b) Find (i) $L^{-1}\left[\frac{e^{-\pi s}}{s^2 - 2s + 2}\right]$

(ii) $L^{-1}\left[\tan^{-1}\left(\frac{s+a}{b}\right)\right]$

(c) Find the solution of one dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ under the boundary conditions $u(0, t) = 0$
$u(1, t) = 0$ and $u(x, 0) = x$
$0 < x < \ell$, $\ell$ being length of the rod.

6. (a) A string is stretched and fastened to two points distance $\ell$ apart. Motion started by displacing the string in the form $y = a \sin\left(\pi x / \ell\right)$ which it is releas at time $t = 0$. Show that the displacement of a point at a distance x from o end at time t is given by $y_{(x,t)} = a \sin\left(\frac{\pi x}{\ell}\right) \cos\left(\frac{\pi c t}{\ell}\right)$.

(b) Find the residue of $\frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)^2}$ at its poles.

(c) Find Fourier series of $x \cos x$ in $(-\pi, \pi)$