Total No. of Questions : 8]

SEAT No. :

P3853

[Total No. of Pages : 4

[5057] - 203

S.E. (Civil) (Semester - I)

STRENGTH OF MATERIALS

(2012 Pattern)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*
3) *Use of electronic pocket calculator is allowed.*
4) *Assume suitable data, if necessary.*
5) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6 and Q. No. 7 or Q. No. 8.*

Q1) a) A compound bar ABC 2m long is made up of two parts 'AB' of aluminum and 'BC' of steel having cross sectional area of steel half of the aluminum bar. The rod is fixed at 'A' and subjected to an axial pull of 250kN at end 'C'. If the elongations of both materials is equal, find the lengths of each part assuming E_{steel} = 200GPa and $E_{aluminium}$ as one third of steel. **[6]**

b) A simply supported beam 7m span carries u.d.l. of 5kN/m over entire span. Find the maximum bending stress induced if the cross section is as shown in Fig. 1.1. **[6]**

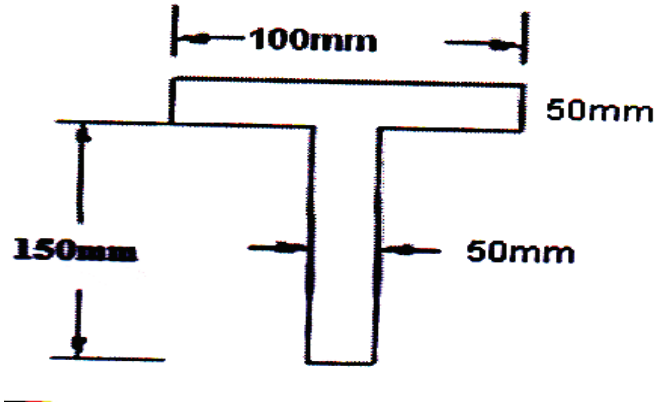

Figure 1.1

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OR

P.T.O.

Q2) a) A steel bar 2m long is at 30° C. The temperature of the rod is increased by 115° C. Find **[6]**

i) free expansion of the rod

ii) temperature stress produced if expansion is prevented and nature of the stress

iii) stress produced if 2.5mm expansion is permitted. Assume supports are unyielding? Take E = 210 GPa, and $\alpha = 12 \times 10^{-6}$ /° C, Assume bar diameter = 18mm.

b) An I section has following dimensions. Web: 250mm × 10mm, Flanges: 150mm × 20 mm. The maximum shear stress developed in the beam is 20 MPa. Find the sheer force to which the beam is subjected. **[6]**

Q3) a) Find maximum torque that can be safely applied to a shaft of 80mm diameter. The permissible angle of twist is l° in a length of 3m and shear stress not to exceed 42 MPa. Take G= 84 MPa. **[6]**

b) A shaft of 95 mm diameter transmits 200 KW power at 100 rpm. If at a section bending moment is 15 kN-m, find the principal stress, maximum shear stress. **[6]**

OR

Q4) a) A steel rod 25 mm in diameter is 3.5m long. Find the maximum instantaneous stress induced and workdone at maximum elongation when a load of 100 kN is suddenly applied. Take E =210 GPa. **[6]**

b) A hollow shaft having an inside diameter 75% of its outer is to replace a solid shaft transmitting the same power at same speed. Calculate the percentage saving in material if material to be used is also the same. **[6]**

Q5) a) An overhanging beam ABC simply supported at ‘A’ and ‘B’ is loaded with udl of intensity 50kN/m acting on 3m length from ‘A’ and a point load of 15kN acting at free end ‘C’. Draw B.M.D. and S.F.D. Assume l(AB) = 4m and l(BC) = 1m. **[7]**

b) Draw shear force diagram, bending moment diagram for the beam ABCD with end 'A' hinged and loaded as shown in Figure 5.1. **[6]**

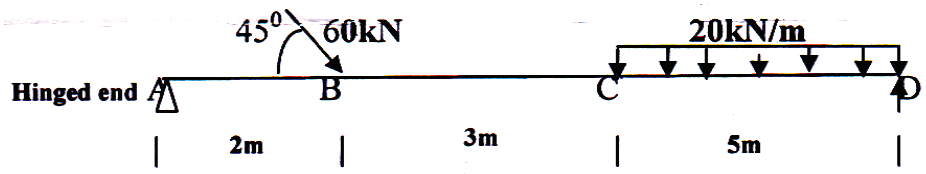

Figure 5.1

OR

Q6) a) Draw shear force diagram and bending moment diagram for the beam as shown in fig.6. 1. Indicate the numerical values at all important section. Find the position and value of maximum bending moment. **[7]**

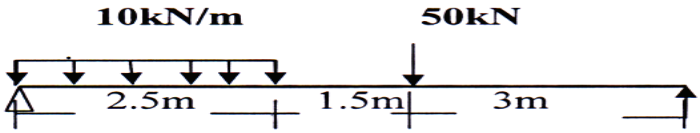

Figure 6.1

b) The diagram shown in fig. 6.2 is the shear force diagram for a beam which rests on two supports, one being at the left hand end. No couple is acting on beam. Draw BMD and load diagram. **[6]**

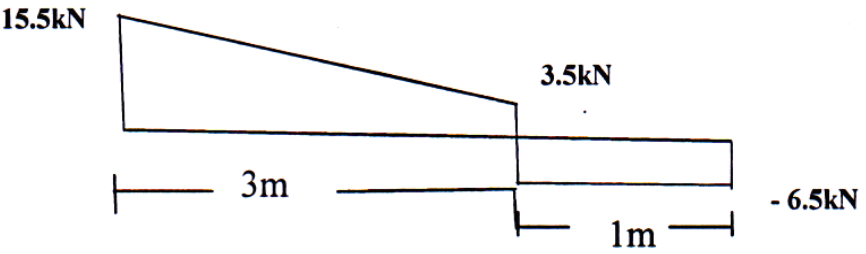

Figure 6.2

Q7) a) Compare the crippling loads given by the Euler's and Rankine's formula for a circular column of 40mm diameter and 2000m long. Take yield stress as 300MPa. Rankine's constant a =1 /7500 and E = 200GPa. Assume column fixed at one end and free at another end. **[6]**

b) State assumptions made in Euler's theory and its limitations. **[7]**

OR

Q8) a) Explain core of the section and hence obtain a core section for a hollow circular column of external and internal diameter 'D' and'd' respectively. **[6]**

b) A hollow rectangular section is having external size 500mm × 350 mm and internal size 400 mm × 250mm. It carries a vertical load of 100 kN at the outer edge of the column on X-axis. Calculate maximum and minimum intensities of stress in the section. **[7]**

Total No. of Questions : 8] **SEAT No. :**

P3409 **[Total No. of Pages : 3**

[5057] - 223
S.E. (Mechanical Sandwich) (Semester - I)
FLUID MECHANICS AND MACHINERY
(2012 Pattern)

Time : 2 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Answers should be written in same books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***
7) ***Assume suitable data, if necessary.***

Q1) a) Explain different types of fluids with a graph of shear stress versus velocity gradient and give suitable examples. **[6]**

b) The velocity distribution of fluid flow over plate is given by: $u = 4y - y^2$ for $y \leq 2m$ where, u is the velocity in m/s at a distance 'y' meter above plate. If the coefficient of dynamic viscosity is 1.5 Pa-s. Determine the shear stress at y = 0 and at y = 2. **[6]**

OR

Q2) a) The velocity vector in a two-dimensional flow field is given as: **[6]**

$$\bar{V} = x^2yi - xy^2j$$

Check whether flow is possible. Also find whether the flow is rotational. If so, find magnitude of rotation at a point (2, 3).

b) Derive an expression for total pressure and centre of pressure on an inclined plane surface. **[6]**

Q3) a) What is Pitot tube? How it is used to measure velocity of flow at any point in a pipe or channel? **[6]**

b) Obtain the expression for the force exerted by a jet of water on a stationary inclined fixed flat plate in the direction of the jet. **[7]**

OR

P.T.O.

Q4) a) Derive an expression for the power transmission through the pipes. Find also the condition for maximum transmission of power. **[6]**

b) Two pipes running parallel, are joined end to end. The total discharge to be carried by the system is 2000 lit/sec. Determine the discharge carried by each pipe. Particular of pipes are as follows: **[7]**

Pipe	Friction Factor	Diameter (m)	Length (m)
A	0.018	0.60	1000
B	0.020	0.80	800

Q5) a) Define and Explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine. **[6]**

b) Using Buckingham's π - theorem, shown that the shear stress of the pipe wall given by, $\tau_0 = \rho V^2 f\left(\frac{\rho V d}{\mu}\right)$

Where, V = Average velocity, ρ=density, μ= viscosity, d = Pipe diameter. **[7]**

OR

Q6) a) Describe briefly the functions of various main components of Pelton turbine with neat sketch. **[5]**

b) The hub diameter of a Kaplan Turbine working under a head of 12 m is 0.35 times the diameter of the runner. The turbine is running at 100 r.p.m. If the vane angle of the extreme edge of the runner at outlet is 15° and flow ratio 0.6, find: **[8]**

i) Diameter of the runner,
ii) Diameter of the boss and
iii) Discharge through the runner.

The velocity of whirl at outlet is given as zero.

Q7) a) The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. Determine the minimum starting speed of the pump if it works against a head of 30 m. **[6]**

b) Describe multistage pump with **[6]**

i) Impellers in parallel, and
ii) Impellers in series.

OR

Q8) a) Find the number of pumps required to take water from a deep well under a total head of 89 m. All the pumps are identical and are running at 800 rpm. The specific speed of each pump is given as 25 while the rated capacity of each pump is 0.16 m^3/s. **[6]**

b) Draw and discuss the main and operating characteristics of centrifugal pump. **[6]**

Total No. of Questions : 8]

SEAT No. : [ ]

P3410

[Total No. of Pages : 2

[5057] - 232
S.E. (Electrical)
POWER GENERATION TECHNOLOGY
(2012 Pattern)

Time : 2 Hours] ***[Max. Marks :50***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***

Q1) a) What is meant by feed water in thermal power plant? Describe it's treatment. **[6]**

b) What is heat balance in diesel power plant? Explain it with a simple example and justify its significance. **[6]**

OR

Q2) a) Explain the gas cycles in gas power plant. **[6]**

b) Draw a block diagram of fuel handling system in thermal power plant indicating the stages involved. **[6]**

Q3) a) Explain in take and out take works in hydro power plant. **[6]**

b) Explain the speed control of wind turbine to develop maximum power. **[7]**

OR

Q4) a) What are the environmental impacts of wind turbines? **[6]**

b) Compare the following dams in hydro power plant : **[7]**

i) Gravity dam

ii) Arch dam

iii) Buttres dam

P.T.O.

Q5) a) Explain the principles of solar radiation. **[6]**

b) What are the impacts of shading on I-V curves in solar energy system? How shading impact can be reduced? **[7]**

OR

Q6) a) What is the scope of fuel cell energy in India? Explain it's working. **[8]**

b) Explain the hybrid stand alone renewable energy system. **[5]**

Q7) a) Differentiate between small, mini and micro hydel plant with regards to their capacity and application. **[6]**

b) With the help of diagram describe the geothermal energy. **[6]**

OR

Q8) a) Write short notes on solar collectors. **[6]**

b) Explain a generic photovoltaic (PV) cell. **[6]**

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Total No. of Questions : 8] **SEAT No. :**

P4952 **[Total No. of Pages : 2**

[5057]-234
S.E. (Electrical) (Semester - I)
Analog & Digital Electronics
(2012 Pattern)

Time : 2 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q.no. 1 or 2,Q.no. 3 or 4,Q.no. 5or 6,Q.no.7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of non programmable calculator is permitted.***

Q1) a) State demorgan's theorem and using Boolean algebra prove that the following **[6]**

1) $\overline{A}B\,C\overline{D} + B\,C\overline{D} + B\,\overline{C}\overline{D} + B\overline{C}D = B(\overline{D} + \overline{C})$

2) $\overline{A} + B(A + B + D)\overline{D} = B\overline{D}$

3) $A + \overline{A}B + A.\overline{B} = A+B$

b) Explain in details different types of shift resisters along with data movements. **[6]**

OR

Q2) a) Explain the working of D & JK Flip flop with truth tables. **[6]**

b) Convert following hexadecimal numbers to octal numbers. **[6]**

i) $(A72E)_{16}$

ii) $(0.BF85)_{16}$

iii) $(A7.78)_{16}$

Q3) a) Draw and explain the functional block diagram of the LM 317 three terminal adjustable regulator. **[6]**

b) Draw the diagram of IC 555 configured in Monostable mode. Draw necessary waveforms. Give the formula for T_{on}. **[7]**

P.T.O.

OR

Q4) a) Explain the application of OPAMP as a Schmitt Trigger. Explain Hysteresis of it. **[7]**

b) Explain first order high pass filter with neat circuit diagram and frequency response. **[6]**

Q5) a) Draw and Explain Transfer characteristics of JFET. **[6]**

b) Write a short note on Darlington pair. **[6]**

OR

Q6) a) Write a short note on Push pull amplifier. **[6]**

b) What is DC load line? Derive equation for DC load line and show Q point on DC load line. **[6]**

Q7) a) Explain the working of single phase half wave rectifier with RL load with neat sketch and draw its waveform. **[6]**

b) A three phase bridge rectifier is connected to an R load. Derive expression for the load voltage & current. **[7]**

OR

Q8) a) A voltage of 220 sin (100πt) is applied to a half wave rectifier with a load resistance 10K ohm. Calculate the maximum current, rms current, average current, ac power input, dc power output and ripple factor. **[7]**

b) What is need of filter circuit? Explain LC filter. **[6]**