

Library  
28/11/2015

S.Y.B.Tech (Civil) sem III  
Building Construction,  
Bharatiya Vidya Bhavan's



# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai - 400058.



End Semester Exam  
November 2015

Max. Marks: 100

Class: S. Y. B. Tech

Program: Civil Engineering

Name of the Course: Building Construction

Duration: 3 hrs

Semester: III

Course Code : BTC206

### Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six. *Master file.*
3. Draw neat diagrams
4. Assume suitable data if necessary

- Q1 a Discuss the requirements of good foundation and explain with the help of sketch well foundation. 7
- b Explain the need of DPC and waterproofing in building. 6
- c Write down the classification of stone masonry and explain any one with help of sketch 7
- Q2 a Define bond in brick masonry and discuss different types of bond. 9
- b Discuss the precautions to be taken during plastering work. 6
- c Discuss the basic components of buildings with the help of sketch. 5
- Q3 a Discuss the different types of composite masonry in detail. 8
- b Explain with the help of sketch 6
- i) Flush pointing
- ii) Recessed pointing
- iii) V pointing
- c Write short note on 6
- i) Form work
- ii) Madras terrace roofing
- Q4 a Enlist the classification of stairs and explain any one along with sketch. 8
- b Draw neat and labeled sketch of door frame and discuss about requirements of materials for door frame. 6
- c Classify the building based on occupancy and discuss hazardous building. 6

S.Y.B. Tech. Civil - Sem III

Building Construction - Dt - 28/11/15

- Q5 a State the general fire safety requirements of a building 6
- b Discuss the essential requirements of scaffolding along with the parts. 7
- c Describe in detail flag stone flooring. 7
- Q6 a Describe with the help of sketch, the method of taking a house connection for water supply. 6
- b Discuss the need of ventilation in a building and how do you achieve it by natural and artificial means. 6
- c Discuss the various types of hinges for doors and window along with sketch. 8
- Q7 a Explain the concept of green building. 6
- b Discuss the precautions to be taken during construction of brickwork. 6
- c Explain lean to roof with sketch. 8

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S.Y.B.Tech - Sem III civil.

Engineering Geology.  
Bharatiya Vidya Bhavan's



**Sardar Patel College of Engineering**

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Exam

November 2015

Max. Marks: 100

Duration: 3 hrs

Class: S.Y.B.Tech (Civil)

Semester: III

Name of the Course: Engineering Geology

Course Code :BTC205

**Instructions:**

1. **Question No 1 is compulsory.**
2. Attempt any **four** questions out of the remaining six questions.
3. Draw neat and labeled diagrams wherever necessary.
4. Figures to the right indicate full marks.

Master file.

**Q.1A. Distinguish between the following terms:**

(10)

- a) Anticline and Syncline.
- b) Normal fault and Reverse fault.

**Q.1B. Describe the five types of Sand dunes.**

(5)

**Q.1C. Name the following:-**

- a) Texture in which large euhedral grains are embedded in fine grained groundmass. (1)
- b) Parent rock of Quartzite and Gneiss and one use of each. (2)
- c) Structure in which light and dark minerals segregate into alternate bands. (1)
- d) Name any two volcanic igneous rocks. (1)

**Q.2A. Explain the erosional and depositional features formed by the action of the rivers.** (10)

**Q.2B. List the factors that control the rate of weathering of rocks.**

(5)

**Q.2C. Define the physical properties, chemical composition, occurrences and uses of the following mineral. (ANY ONE)**

(5)

1) Amphibole

2) Garnet

①

(P.T.O)

Q.3A. Explain any One of the rock in term of its nature, mineral composition, texture, structure, varieties, uses and whether it is suitable for construction purpose depending on its mineralogy. (ANY ONE)

1) Gneiss (8)

2) Sandstone

Q.3B. Explain in detail the Bowen's Reaction Series with a diagram and show the table listing the relative stabilities of rock forming minerals during weathering. (7)

Q.3C. Describe any five structures found in Igneous rocks. (5)

Q.4A. Describe briefly the Stratigraphy of Cuddapah Supergroup in India. Discuss its age, distribution, lithology, structure, classification and its economic importance. (10)

Q.4B. Classify the types of fold depending on the position of the axial plane. (5)

Q.4C. Explain the following terms:-

1) Principles of Stratigraphy (3)

2) Graben (2)

Q.5A. Discuss the various engineering properties of rocks that are important in the selection of rocks for construction purposes. (8)

Q.5B. Describe the Wenner method used in Resistivity survey and state any two uses of Resistivity method. (8)

Q.5C. Explain the application of Seismic method in Civil engineering problems. (4)

Q.6A. Explain Earth Dam and List the geological factors that are taken into consideration during the selection of a dam site. (10)

Q.6B. Define Aquiclude and Aquifuge and Explain the four types of Aquifer with a suitable diagram. (10)

Q.7A. Define Landslides and state the Causes and the methods used for the prevention of Landslides. (10)

Q.7B. Discuss the most favorable and unfavorable cases for tunnel site selection near steep slopes with suitable diagrams. (5)

Q.7C. List the geological problems that can cause failure of a Reservoir. (5)



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ANDHERI (WEST), MUMBAI - 400 058.



Library  
Exam Section

23/11/2015

End Semester Exam  
Nov 2015- Dec 2015

Max. Marks: 100

Duration: 3Hrs.

Class: S.Y.B.Tech. Civil

Semester: III

Name of the Course: Engineering Materials.

Program: CIVIL

Course Code: BTC204

Instructions:

1. Attempt any five questions out of seven.
2. Question No 1 is compulsory. *S.Y.B.Tech.Civil - Sem III*
3. Draw neat diagrams *Engg- Materials*
4. Assume suitable data if necessary

*Master file.*

Question No.		Max. Marks
Q1(a)	Describe the process of Manufacturing of glass along with neat sketch and flow chart. **Explain only tank furnace, any two fabrication process and one annealing process in it* "	10
(b)	Explain any two process involved in the Fabrication of Plastic	5
(c)	Explain any five uses of plastic in construction.	5
Q2 (a)	Explain the following test on bricks. 1] Absorption 2]. Presence of soluble salts	4
(b)	State any five factors affecting quality of bricks.	5
(c)	Explain Prestressed Concrete, its types and advantages and disadvantages.	11
Q3 (a)	Explain the requirements of building material.	4
(b)	State the constituents of cement in detail.	8
(c)	Describe Quarrying, Dressing, Seasoning, and preservation of stones.	8
Q4 (a)	Enumerate any five types of Cement in detail.	10
(b)	Explain Hydraulic Lime and also state its Classification.	5
(c)	Explain the following special Mortar, 1]. Fire resistant mortar 2]. X-ray shielding mortar	5
Q5 (a)	Describe the following. 1] Roofing Tile 2] Flooring tile 3] Terracotta 4] Earthenware 5] Stoneware.	10
(b)	Describe any two defects of timber in detail.	5
(c)	State the uses of timber in construction	5
Q6 (a)	Describe Rusting and Corrosion in detail.	6
(b)	State the uses and alloys of Tin in detail.	6
(c)	Explain Linolium and Geosynthetics.	8
Q7 (a)	Describe any four Types of Varnish and four Types of Distemper.	8
(b)	Define. 1] Bitumen 2] Asphalt 3] Tar	6
(c)	Give a short brief on WaterProofing and Sound Insulating Materials.	6





# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Exam

November 2015



Max. Marks: 100

Class: SE

Semester: III

Name of the Course: STRENGTH OF MATERIAL

Duration: 3hrs

Program: CIVIL

Course Code: BTC 203

### Instructions:

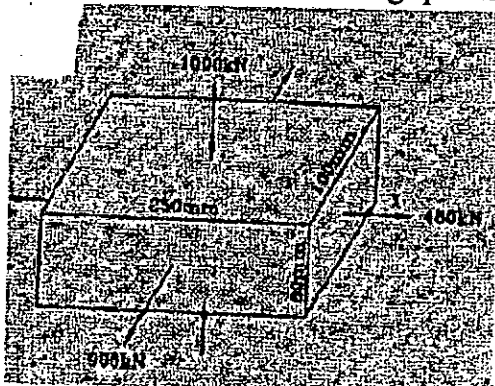
1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Master file.

Question  
No

Maximum  
Marks

- Q1(a) Derive the relationship between Young's Modulus and Bulk Modulus. (5)
- (b) Derive relation among bending moment, shear force and rate of loading. (5)
- (c) Derive the bending equation:  $\frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R}$  (5)
- (d) Derive the torsion formula with usual notations. (5)
- Q2(a) Calculate the change in length of a tapering bar of circular cross section with length 'L' diameters at the two ends  $d_1$  and  $d_2$ , subjected to an axial load of 'P', if Hooke's law is obeyed. (8)
- (b) A rectangular block 250 mm x 100 mm x 80 mm is subjected to axial loads as follows: (12)
- 480kN tensile in the direction of its length; 900kN tensile on the 250 mm x 80 mm faces; 1000kN compressive on the 250 mm x 100 mm faces. Assuming Poisson's ratio as 0.25, find in terms of modulus of elasticity  $E$  of the material the strains in the direction of each force. If  $E = 2 \times 10^5 \text{ N/mm}^2$ , find the values of the modulus of rigidity and bulk modulus for the material of the block. Also, calculate the change in the volume of the block due to the applications of the loading specified above.



(Fig. 1)

Q3(a) Show that for a rectangular section maximum shear stress is 1.5 times the mean shear stress resisted by the section. (6)

(b) Analyse the beam ABCD shown in Fig. (2); draw the SFD, BMD and AFD for the beam. (14)



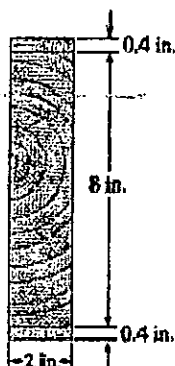
(Fig. 2)

Q4(a) What is section modulus? Derive the section modulus for the hollow circular section. (4)

(b) Write down the assumptions in the theory of pure bending? (4)

(c) A cast iron beam section is of I section with a top flange 80 mm x 20 mm thick, bottom flange 160 mm x 40 mm thick and the web 200 mm deep and 20 mm thick. The beam is simply supported on a span of 5 meters. If the tensile stress is not to exceed 20 N/mm<sup>2</sup>, find the safe UDL which the beam can carry. (12)

Q5(a) The cross section of a simply supported beam in Fig. (3) has a wood core and aluminum face plates. The beam is 72 in. long and carries a 6000-lb concentrated load 24 in. from the right end of the beam. Determine the maximum vertical shear stress in the beam. Use  $E_{wd} = 1.5 \times 10^6$  psi and  $E_{al} = 10 \times 10^6$  psi. (10)

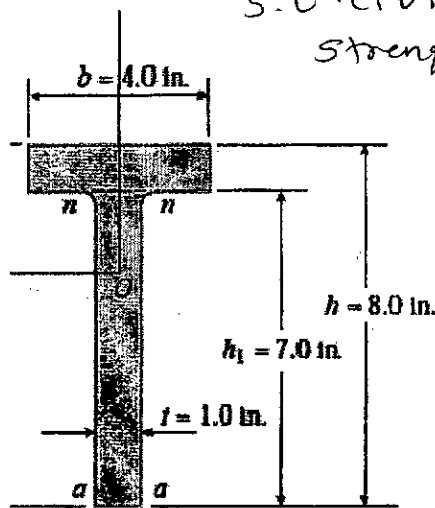


(Fig. 3)

(b) A beam having a T-shaped cross section (Fig. 4) is subjected to a vertical shear force  $V = 10,000$  lb. The cross-sectional dimensions are  $b = 4$  in.,  $t = 1.0$  in.,  $h = 8.0$  in., and  $h_1 = 7.0$  in. Determine the shear stress  $\tau_1$  at the top of the web (level  $nn$ ) and the maximum shear stress  $\tau_{max}$ . (Disregard the areas of the fillets.) (10)

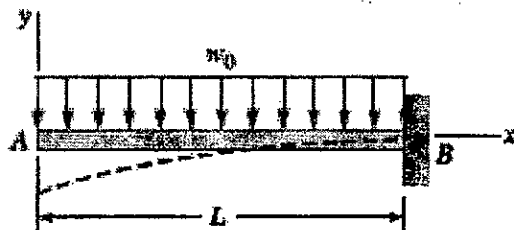
(2)





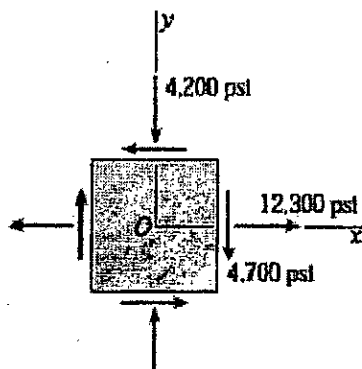
(Fig. 4)

- Q6(a) The cantilever beam AB of length  $L$  shown in Fig. (5) carries a UDL of intensity  $w_0$ , which includes the weight of the beam. (1) Derive the equations for slope and deflection (2) Compute the maximum displacement if the beam has  $L = 8\text{ft}$ ,  $w_0 = 400\text{ lb/ft}$ , and  $E = 29 \times 10^6\text{ psi}$ ,  $I = 285\text{ in}^4$ ,  $Z$  (section modulus) =  $45.6\text{ in}^3$ . (10)



(Fig. 5)

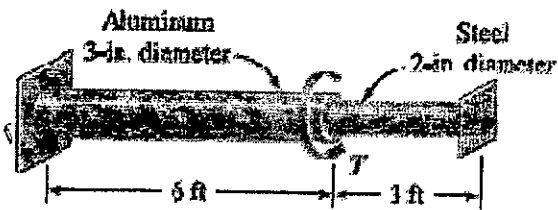
- (b) An element in plane stress is subjected to stresses  $\sigma_x = 12,300\text{ psi}$ ,  $\sigma_y = -42,00\text{ psi}$ , and  $\tau_{xy} = -4700\text{ psi}$  as shown in Fig. 6. Determine the principal stresses and show them on a sketch of properly oriented element. (b) Find the maximum shear stresses and show them on a sketch of properly oriented element. (Consider only the in-plane stresses). (10)



(Fig. 6)

- Q7(a) The shaft in Fig. (6) consists of a 3-in.-diameter aluminum segment that is rigidly joined to a 2-in.-diameter steel segment. The ends of the shaft are attached to rigid supports. Calculate the maximum shear stress developed in each segment when the torque  $T = 10\text{ kip. in.}$  is applied. Use  $G = 4 \times 10^6\text{ psi}$  (10)

S.E. Civil - Sem III Strength of Material  
for aluminum and  $G = 12 \times 10^6$  psi for steel. Dt. 20/11/15



- (b) A masonry chimney having the shape of a frustum of a cone is 25 metres high. The external diameter at the top and the internal diameter at the bottom is 2 meters. The chimney is 0.5 metre thick at the base. If the total weight of the chimney is 1600 kN find the uniform horizontal wind pressure that may act per unit projected area of the chimney in order tension at the base may be just avoided. (10)

(4)

Library Set  
18/11/2015

S.Y.B.Tech. Sem III  
Surveying - I  
Bharatiya Vidya Bhavan's



# Sardar Patel College of Engineering



(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Exam  
November 2015

Max. Marks: 100

Duration: 3 hour

Class: S.Y.B.Tech.

Semester: III

Program: Civil

Name of the Course: Surveying-I

Course Code : BTC-202

### Instructions:

Master file.

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Question No	Answer the following questions	Maximum Marks
Q1	a Explain the term Reconnaissance in surveying.	05
	b Discuss the types of variation in magnetic declination.	05
	c What are the characteristics of contours?	05
	d Describe in brief the methods of orienting plane table.	05

Question No	Answer the following questions	Maximum Marks
Q2	a The following consecutive readings were taken with a dumpy level and a 4 m levelling staff on a continuously sloping ground on a straight line at 20 m interval. 0.720, 1.890, 2.480, 3.560, 0.185, 1.160, 1.895, 2.720, 3.840, 0.845, 1.835 and 2.960. If the R.L. of first point is 150.50 m, find the RL of all remaining points by rise and fall method. Rule out a page of field book and apply appropriate checks.	10
	b What is spire test? Describe the test in detail.	05
	c State the advantages and disadvantages of plane table survey.	05

Question No	Answer the following questions	Maximum Marks
Q3	a What do you mean by zero circle of planimeter? Following observations were taken from planimeter by keeping anchor point inside the area. Initial reading - 7.425, Final reading - 1.845, multiplying constant (M) = 100 cm <sup>2</sup> , C = 30, and zero crosses the pointer thrice in anticlockwise direction. Find the total area of the plan?	10
	b Describe the method of profile levelling in detail.	06
	c Explain the temporary adjustment of Theodolite.	04

Question

Answer the following questions

Maximum  
Marks

No

Q4

- a Calculate the missing length of line AB and bearing of line EA from the following data:

Line	Length (m)	Bearing
AB	??	65°30'
BC	78	114°45'
CD	52	208°20'
DE	65	235°30'
EA	115	??

- b Explain the method of Reciprocal ranging. 04
- c Derive an expression for the effect of curvature and refraction. 06

Question

Answer the following questions

No

Q5

- a The following reciprocal levels were taken with a dumpy level; determine the true difference in elevation between P and Q. Also find the R.L. of Q, if that of P is = 185.750 m. . 06

Instrument setup near	Staff reading on	
	P	Q
P	1.675	2.545
Q	0.460	1.325

- b Define two point problem and explain how it can be solved on field. 08
- c Explain the method of repetition for measurement of horizontal angles. 06

Question

Answer the following questions

No

Q6

- a Discuss in detail spot level method of contouring. 08
- b Gopal is travelling in a ship stands on the deck of a ship and sees a light house which is 45 m above the sea level. If the height of the Gopal's eye above sea level is 5.2 m, find the distance between Gopal and light house. 06
- c The following perpendicular offsets were taken at 20 m intervals from a survey line CD on an irregular boundary line. 06  
1.65, 2.30, 3.58, 4.85, 3.19, 2.87, 5.12, 2.25, 3.66, 4.23 and 4.31 m.  
calculate the area enclosed between survey line and irregular boundary by average ordinate rule, Simpson's rule, and Trapezoidal rule

Question

Answer the following questions

No

Q7

- a Explain the balancing of fore sight and back sight. 05
- b How will you measure the bearing of survey line using Theodolite? 05
- c The distance between two stations measured with a 20 m chain was found to be 894 m. the same distance was found to be 895 m, when 30 m chain was used. If the 20 m chain was 0.15 m short, what was the error in 30 m chain? 06
- d Explain the Bowditch rule and transit rule for balancing of traverse. 04



# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Exam

November 2015



Max. Marks: 100

Duration: 03 hours

Class: S.Y.Btech

Semester: III

Program: Civil

Name of the Course: Engineering Mathematics III

Course Code : BTC201

### Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Each question has a 6-6-8 marks break up.
4. Assume suitable data if necessary.

Master file.

Question

Maximum

No.

Marks

Q1(a)

Find Laplace transforms of  $f(t) = t \left( \frac{\sin t}{e^t} \right)^2$

(b) Evaluate by Green's thm  $\oint_C e^{-x} (\sin y dx + \cos y dy)$  where C is the rectangle with vertices (0, 0),  $(\pi/0)$   $(\pi, \pi/2)$  & (0,  $\pi/2$ ).

(c) Obtain the Fourier Series for  $f(x) = x^2$  in  $(0, 2\pi)$

Q2(a).

Evaluate  $L^{-1} \left\{ \frac{1}{S^3(S-1)} \right\}$

(b) Find the eigen values and the corresponding eigenvectors of the matrix

$$\begin{bmatrix} -2 & 5 & 4 \\ 5 & 7 & 5 \\ 4 & 5 & -2 \end{bmatrix}$$

(c) Obtain the Fourier series for

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi} & -\pi < x < 0 \\ 1 - \frac{2x}{\pi} & 0 < x < \pi \end{cases}$$

Q3(a)

For what values of 'a' and 'b' the equations

$$x + 2y + 3z = 4$$

$$x + 3y + 4z = 5$$

$$x + 3y + az = b$$

Have

- i) No solution
- ii) A unique solution
- iii) Infinite number of solutions

(b) Obtain the half range sine series for

$$f(x) = \begin{cases} \frac{2x}{3} & 0 \leq x \leq \frac{\pi}{3} \\ \frac{\pi-x}{3} & \frac{\pi}{3} \leq x \leq \pi \end{cases}$$

(c) Prove that  $\int_0^{\infty} \frac{\sin 2t + \sin 3t}{te^t} dt = \frac{3\pi}{4}$

Q4(a) Obtain complex form of the Fourier series for  $f(x) = e^{-x} \quad 0 \leq x \leq 2\pi$

(b) Evaluate  $\mathcal{L} \left\{ e^{-2t} \frac{\sin 2t \cosh t}{t} \right\}$

(c) Verify Divergence Theorem for  $\vec{F} = 4x\hat{i} - 2y^2\hat{j} + z^2\hat{k}$  taken over the bounded by the cylinder  $x^2 + y^2 = 4, z = 0, z = 3$

Q5(a) Prove that the set of functions  $\{1, \sin x, \cos x, \sin 2x, \cos 2x, \dots\}$  is orthogonal over  $(0, 2\pi)$  and construct a corresponding orthonormal set.

(b) Find the characteristic equation of the matrix  $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ . Verify

Cayley - Hamilton theorem and hence evaluate the inverse of matrix.

(c) Evaluate:  $\mathcal{L}^{-1} \left\{ \frac{s^2 + 2s + 3}{(s^2 + 2s + 2)(s^2 + 2s + 5)} \right\}$

Q6(a) Prove using convolution theorem

$$\mathcal{L}^{-1} \left\{ \frac{s^2}{(s^2 + a^2)^2} \right\} = \frac{1}{2a} (\sin at + at \cos at)$$

(b) Reduce to normal form the following matrix  $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix}$

(c) Verify Stoke's theorem for the vector field  $\vec{F} = (x^2 - y^2)\hat{i} + 2xy\hat{j}$  over the box bounded by planes  $x = 0, x = a, y = b, z = C$  if the face  $z = 0$  is cut.

Q7(a) Evaluate:  $\mathcal{L}^{-1} \left\{ \log \left| \frac{s^2 + b^2}{s^2 + a^2} \right| \right\}$

(b) Find Laplace transforms of  $f(t) = \sin \sqrt{t}$

(c) If  $f(x) = x \quad 0 \leq x \leq 2$

Find half range cosine series using Parseval's identity deduce

$$\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$



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(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai - 400058.



Library  
6/01/16

End Semester Exam (KT)

January 2016

Max. Marks: 100 S.Y. B.Tech. (Civil) Sem III  
Class: SE Strength of Material Semester: III dt. 6.1.16  
Name of the Course: STRENGTH OF MATERIAL

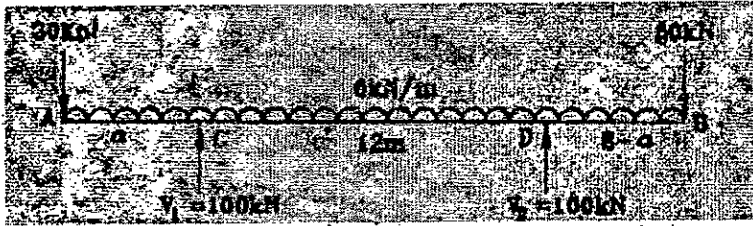
Duration: 3hrs  
Program: CIVIL  
Course Code : BTC 203

**Instructions:**

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

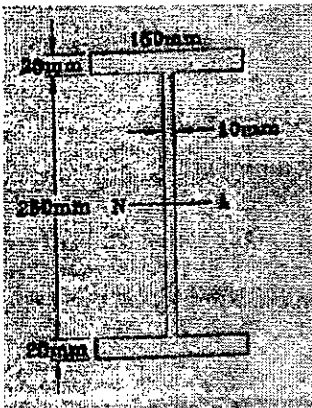
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Question No		Maximum Marks
Q1(a)	Define pure bending, Neutral axis and Moment of resistance.	(5)
(b)	What are the assumptions made in theory of simple bending.	(5)
(c)	Derive the relationship between Young's Modulus and Bulk Modulus.	(5)
(d)	For a circular shaft, Derive the torsion formula: $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{R}$	(5)
Q2(a)	A compound tube is made by stinking a thin steel tube on a thin brass tube. $A_s$ and $A_b$ are the sectional areas of the steel and brass tubes and $E_s$ and $E_b$ are the corresponding values of Young's modulus. Show that for any tensile load the extension of the compound tube is equal to that of a single tube of the same length and total cross-sectional area, but having a Young's modulus of $(E_s A_s + E_b A_b)/(A_s + A_b)$ .	(10)
(b)	A 15 mm diameter steel rod passes centrally through a copper tube 50mm external diameter and 40mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly home on the projecting parts of the rod. If the temperature of the assembly is raised by $60^\circ\text{C}$ , Calculate the stresses developed in copper and steel. Take $E_s = 2.1 \times 10^5 \text{ N/mm}^2$ , $E_c = 1.05 \times 10^5 \text{ N/mm}^2$ , $\alpha_s = 12 \times 10^{-6} \text{ per } ^\circ\text{C}$ , $\alpha_c = 17.5 \times 10^{-6} \text{ per } ^\circ\text{C}$ .	(10)
Q3(a)	Derive relationship amongst bending moment (M), shear force (V) and load intensity (W).	(6)
(b)	A horizontal beam AB, 20 meters long supported on two props 12 meters apart carries a UDL of 6 kN/m together with concentrated loads of 30 kN at the left end A and 50kN at the right end B. The props are so located that the reaction is the same of each support. Determine the position of the props and draw the SFD and BMD for the beam.	(14)



(Fig. 1)

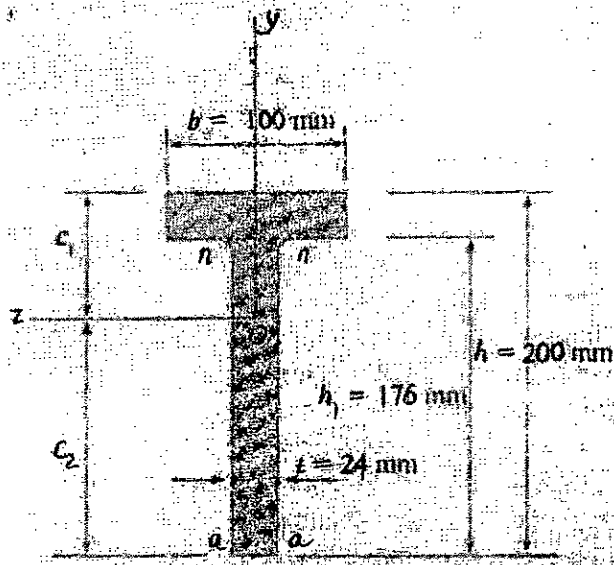
- Q4(a) A beam of span  $L$  metres simply supported at the ends, carries a central load  $W$  Newton. The beam section has an overall depth of 290mm with horizontal flanges each 150mmx20mm and a vertical web 250mmx10mm. If the maximum shear stress is to be 45  $\text{N/mm}^2$  when the maximum bending stress is 150  $\text{N/mm}^2$ , calculate the value of the centrally applied load  $W$  and the span  $L$ . (14)



(Fig. 2)

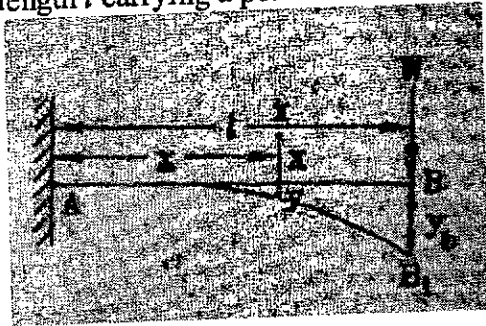
- (b) What is temperature stress? Derive the expression for temperature stress produced in a bar with modulus of elasticity  $E$  and coefficient of thermal expansion  $\alpha$  due to temperature rise of  $t$   $^{\circ}\text{C}$  which is prevented from free expansion. (06)
- Q5(a) Derive the bending equation :  $\frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R}$  (5)
- (b) Derive the section modulus for the rectangular and circular section. (5)
- (c) A beam having a T-shaped cross section (Fig. 3) is subjected to a vertical shear force  $V = 45\text{kN}$ . The cross-sectional dimensions are  $b = 100\text{mm}$ ,  $t = 24\text{mm}$ ,  $h = 200\text{mm}$ , and  $h_1 = 176\text{mm}$ . Determine the shear stress  $\tau_1$  at the top of the web (level  $nn$ ) and the maximum shear stress  $\tau_{\text{max}}$ . (Disregard the areas of the fillets.) (10)





(Fig. 3)

- Q6(a) Derive the equations for slope and deflection for a cantilever beam AB of length  $l$  carrying a point load  $W$  at the free end. (10)



(Fig. 4)

- (b) At a certain point in a strained material the intensities of normal stresses on two planes at right angles to each other are  $20 \text{ N/mm}^2$  and  $10 \text{ N/mm}^2$  both tensile. They are accompanied by shear stress of  $10 \text{ N/mm}^2$ . Find the principal planes, principal stresses and the maximum shear stress. (10)
- Q7(a) A metal bar of  $10 \text{ mm}$  diameter when subjected to a pull of  $23.55 \text{ kN}$  gave an elongation of  $0.3 \text{ mm}$  on a gauge length of  $200 \text{ mm}$ . In a torsion test on the same material, a maximum shear stress of  $40.71 \text{ N/mm}^2$  was measured on a bar of  $50 \text{ mm}$  diameter, the angle of twist measured over a length of  $300 \text{ mm}$  being  $0^\circ 21'$ . Determine the Poisson's ratio of the material. (10)
- (b) A masonry chimney having the shape of a frustum of a cone is  $20$  metres high. The external diameter at the top and the internal diameter at the bottom is  $2$  meters. The chimney is  $0.5$  metre thick at the base. If the total weight of the chimney is  $1800 \text{ kN}$  find the uniform horizontal wind pressure that may act per unit projected area of the chimney in order tension at the base may be just avoided. (10)



S.Y.B.Tech.(Civil) sem III  
Engineering Geology -  
Bharatiya Vidya Bhavan's



**Sardar Patel College of Engineering**  
(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai - 400058.  
End Semester Exam  
January 2016

Max. Marks: 100

Duration: 3 hrs

Class: S.Y.B.Tech (Civil)

Semester: III

Name of the Course: Engineering Geology

Course Code :BTC205

**Instructions:**

1. Question No 1 is compulsory.
2. Attempt any **four** questions out of the remaining six questions.
3. Draw neat and labeled diagrams wherever necessary.
4. Figures to the right indicate full marks.

Master file.

**Q.1A. Define the following terms:** (10)

- a) Types of silicate structure.
- b) Interior structure of the Earth.

**Q.1B. Describe any five sedimentary structures with diagrams.** (5)

**Q.1C. Define the following terms:-** (5)

- a) Strike
- b) Dip
- c) Aquifer
- d) Poikilitic texture
- e) Landslide

**Q.2A. Explain Luster, Form, Fracture, Cleavage and Specific Gravity property of minerals with their two classification and examples.** (10)

**Q.2B. Explain in detail any five types of Mechanical weathering.** (5)

**Q.2C. Define the physical properties, chemical composition, occurrences and uses of the Quartz group.** (5)

**Q.3A. Write short notes on :-** (20)

- a) Bowens Reaction series
- b) Forms shown by Igneous rocks - Sill, Dyke, Phacolith, Lopolith and Lacolith.
- c) Non-clastic sedimentary rocks.

d) Agents of metamorphism.

**Q.4A.** Describe briefly the Stratigraphy of Vindhyan Supergroup in India. Discuss its age, distribution, lithology, fossils, structure, classification and its economic importance. (10)

**Q.4B. Explain the following terms:-** (10)

a) Five types of folding

b) Types of unconformity and columnar joints.

**Q.5A.** Describe the Wenner method used in Resistivity survey and state any two uses of Resistivity method. (10)

**Q.5B.** Explain the Engineering properties of rocks and state whether Granite is suitable for construction purpose depending on these properties. (10)

**Q.6A.** Describe the parts of a Dam with a suitable diagram and explain any two geological factors taken into consideration during the selection of a dam site. (8)

**Q.6B. Explain the following terms:-** (12)

a) Types of Porosity.

b) Water table and Vertical distribution of groundwater.

c) Confined and Unconfined Aquifer.

**Q.7A.** Describe the types of Landslides and state the methods used for the prevention of Landslides. (10)

**Q.7B.** Write a note on tunneling through folded rocks such as Anticline and Syncline and through faulted rocks. (5)

**Q.7C.** List the geological problems that can cause failure of a Reservoir. (5)



BHARATIYA VIDYA BHAVAN'S  
SARDAR PATEL COLLEGE OF ENGINEERING  
GOVERNMENT AIDED AUTONOMOUS INSTITUTE  
ANDHERI (WEST), MUMBAI - 400 058.



Lib - Re - E  
07-01-16

End Semester Exam  
Jan -016

Max. Marks: 100

Duration: 3Hrs.

Class: S.Y.B.Tech. Civil

Semester: III

Name of the Course: Engineering Materials

Program:

Course Code: BTC204

S.Y.B.Tech.(Civil)sem III

**Instructions:**

Engineering Materials.

1. Attempt any five questions out of seven.
2. Question No 1 is compulsory.
3. Draw neat diagrams
4. Assume suitable data if necessary

master file .

Question No.		Max. Marks
Q1(a)	Describe Ready Mixed Concrete and Precast Concrete in detail.	10
(b)	Explain any two process involved in the Fabrication of Plastic	5
(c)	Explain uses of mortar.	5
Q2 (a)	Explain the following test on bricks. 1] shape and size test 2]. Crushing strength	4
(b)	State any five defects affecting quality of bricks.	5
(c)	Explain manufacturing of lime. Note(*explain only 1. collection of lime 2. burning process through intermittent flame klin 3. slaking to paste and powder. With neat	11
Q3 (a)	Explain the uses of lime.	4
(b)	State the constituents of cement in detail.	8
(c)	Describe any four types through which stone gets deteriorates.	8
Q4 (a)	Enumerate any five types of Cement in detail.	10
(b)	Explain Hydraulic Lime and also state its Classification.	5
(c)	Explain the following special Mortar, 1]. sound absorbing mortar 2]. X-ray shielding mortar	5
Q5 (a)	Explain the Physical properties of timber	10
(b)	Describe any two defects of timber in detail.	5
(c)	Explain Hardness test of stone with sketch.	5
Q6 (a)	Describe Rusting and waterproofing materials in detail.	6
(b)	State the uses and alloys of Nickel in detail.	6
(c)	Explain Linolium and Damp proofing materials.	8
Q7 (a)	Describe any four Types of paint.	8
(b)	Define. 1] Bitumen 2] Asphalt 3] Tar	6
(c)	Define Varnish and Distemper.	6



S.Y.B.Tech. (Civil) sem III  
Surveying - I - Dt - 05/01/16.

Bharatiya Vidya Bhavan's



## Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

End semester (Re-examination)

December 2015



Max. Marks: 100

Class: S.Y.B.Tech.

Name of the Course: Surveying-I

Semester: III

Duration: 3 hour

Program: Civil

Course Code : BTC-202

Master file.

### Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Question No	Answer the following questions	Maximum Marks
Q1	a Explain the factors affecting contour interval.	05
	b Describe two peg method of permanent adjustment.	05
	c Differentiate between direct vernier and retrograde vernier	05
	d Explain with neat sketch use of optical square.	05
Question No	Answer the following questions	
Q2	a The following is the page of a level field book. Fill in the missing readings and Calculate R.Ls. of all points. Check the accuracy of calculations.	10

Sl No.	B.S.	I.S.	F.S.	Rise	Fall	R.L.	Remarks.
1	2.150					250.000	B.M.1
2	1.645		?	0.500			
3		2.345		- ?	?		
4	?		1.965	?			
5	2.050		1.825		0.400		
6	?		?	?		251.500	B.M.2
7	1.690		1.570	0.120			
8	2.865		2.100		?		
9			?	?		251.250	B.M.3

	b	Discuss the permanent adjustments of transit Theodolite. Explain the object of these adjustments.	10
Question No		Answer the following questions	
Q3	a	The readings from a planimeter were the following: initial reading = 9.745, final reading = 2.487, the zero crossed the index twice in the counter clockwise direction. The anchor point was kept inside the areas and the constant were $M= 101.8 \text{ cm}^2$ and $C=30$ . Find the area of the plan?	06
Q3	b	What is meant by sensitiveness of bubble tube? Explain how it is determined?	06
	c	Discuss the different methods of interpolating contours.	08

S.Y.B.Tech. (Civil) Sem III  
 Surveying - I. Dt. 05/01/16.

Question No Q4

Answer the following questions

Maximum Marks 10

- a Calculate the missing length and bearing of a line AB from the following Theodolite Traverse data:

Line	Length	Reduced bearing
AB	??	??
BC	453.00	S 21° 49' W
DC	529.40	S 52° 22' E
DA	589.00	N 64° 20' E

- b Explain the method of Reciprocal levelling. 05  
 c Discuss the obstacles in chaining and ranging. 05

Question No Q5

Answer the following questions

- a A chain line PQ intersects a pond. Two points A and B are taken on the chain line on opposite sides of the pond. A line AC, 245 m long, is set out on the left of AB and another line AD, 380 m long, is set out on the right of AB. Points C, B and D are in the same straight line. CB and BD are 105 and 153 m long respectively. Calculate the length AB? 06  
 b Discuss the difficulties in levelling work. 07  
 c Explain the method of reiteration for measurement of horizontal angles. 07

Question No Q6

Answer the following questions

- a Explain the method of resection in plane table survey. 08  
 b Suchita is travelling in a ship stands on the deck of a ship and sees a light house which is 75 m above the sea level. If the height of the Suchita's eye above sea level is 8.2 m, find the distance between Suchita and light house. 06  
 c The following perpendicular offsets were taken from a survey line on an irregular boundary line. 06

Chainage (m)	0	10	20	30	40	50	60	70	80
Offset (m)	4.25	5.38	6.94	6.84	6.25	6.34	6.14	7.23	5.90

Calculate the area enclosed between survey line and irregular boundary by Simpson's rule, and Trapezoidal rule

Question No Q7

Answer the following questions

- a How will you prolong a survey line with a Theodolite? 05  
 b Explain in detail the errors in levelling work. 10  
 c Differentiate between single vernier and double vernier 05

(2)





# Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Exam

November 2015



Max. Marks: 100

Duration: 03 hours

Class: S.Y.Btech

Semester: III

Program: Civil

Name of the Course: Engineering Mathematics III

Course Code : BTC201

### Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Each question has a 6-6-8 marks break up.
4. Assume suitable data if necessary.

Master file.

Question  
No

Maximum  
Marks

Q1(a) Find  $\mathcal{L} \left\{ \frac{\cos 2t \sin t}{e^t} \right\}$

- (b) Verify Green's theorem in the plane for  
 $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$  where C is the boundary of region  
defined by  $y = \sqrt{x}$  &  $y = x^2$ .

- (c) Obtain the Fourier Series for  $f(x) = x$  in  $(0, 2\pi)$

Q2(a) Evaluate:  $\mathcal{L}^{-1} \left\{ \frac{3s+1}{(s+1)^4} \right\}$

- (b) Find the eigen values and the corresponding eigenvectors of the matrix

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 3 & 2 & 3 \end{bmatrix}$$

- (c) Obtain the Fourier series for

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi} & -\pi < x < 0 \\ 1 - \frac{2x}{\pi} & 0 < x < \pi \end{cases}$$

- Q3(a) For what values of  $\lambda$  and  $\mu$  the equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

Have

- i) No solution
- ii) A unique solution
- iii) Infinite number of solutions

(b) Obtain the half range sine series for  $D.T. 04/01/16$ .

$$f(x) = \begin{cases} \frac{2x}{3} & 0 \leq x \leq \frac{\pi}{3} \\ \frac{\pi-x}{3} & \frac{\pi}{3} \leq x \leq \pi \end{cases}$$

(c) Show that  $\int_0^{\infty} e^{-2t} \sin^3 t \, dt = \frac{6}{65}$

Q4(a) Obtain complex form of Fourier series

$$f(x) = e^{ax} \quad x \in (-\pi, \pi)$$

(b) Evaluate  $\mathcal{L} \left\{ e^{-2t} \frac{\sin 2t \cosh t}{t} \right\}$

(c) Verify Divergence Theorem for

$\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$  taken over the rectangular parallelepiped  $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$ .

Q5(a) Show that the functions  $\phi_1(x) = 1$ ,  $\phi_2(x) = x$  &  $\phi_3 = \frac{1}{2}(3x^2 - 1)$  are orthogonal over  $(-1, 1)$

(b) Find the characteristic equation of the matrix  $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ .

Verify Cayley - Hamilton theorem and hence evaluate the inverse of matrix.

(c) Find  $\mathcal{L}^{-1} \left\{ \frac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right\}$

Q6(a) Prove using convolution theorem

$$\mathcal{L}^{-1} \left\{ \frac{1}{(s^2 + a^2)^2} \right\} = \frac{1}{2a^3} (\sin at - at \cos at)$$

(b) Reduce to normal form the following matrix  $B = \begin{bmatrix} 1 & 2 & 1 & 2 \\ 0 & 2 & 1 & 1 \\ 2 & 6 & 3 & 5 \\ 2 & 4 & -2 & 4 \end{bmatrix}$

(c) Verify Stoke's theorem for the vector field  $\vec{F} = (2x - y)\hat{i} - yz^2\hat{j} - y^2z\hat{k}$  over the upper half surface of  $x^2 + y^2 + z^2 = 1$  bounded by its projection on the XY-plane.

Q7(a) Evaluate:  $\mathcal{L}^{-1} \left\{ \log \left| \frac{s^2 + b^2}{s^2 + a^2} \right| \right\}$

(b) Find Laplace transforms of  $f(t) = \sqrt{1 + \sin t}$

(c) By using the sine series for  $f(x) = 1$  in  $0 < x < \pi$ . Hence using

Parseval identity show that  $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$