



Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering

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

Re-Exam
June 2018



Max. Marks:100

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

Semester: IV

Name of the Course: Building Design & Drawing

Q. P. Code:

Duration: 4 Hrs.

Program: Civil Engineering

Course Code : BTC231

Instructions:

1. Question 1 is compulsory. Attempt any four out of remaining six.
2. Answers to all sub questions should be grouped together.
3. Illustrate answer with neat sketches wherever required.
4. Make suitable assumptions where necessary and state them clearly.
5. Figure to right indicate full marks.

Question No		Maximum Marks	Course Outcome	Module no
Q.1	It is proposed to construct a Bungalow for chief engineer of PWD. The requirements for the building are : <ol style="list-style-type: none">1. Entrance lobby- 2.5 m wide.2. Living room – 25-30 m²3. Master bedrooms- (2 Nos.) – 25 m² each4. Engineer Office – 25 m²5. Children bedroom – 15 m²6. Kitchen cum dining hall – 25-30 m²7. Study room – 10-12 m²8. Store room – 10m² <p>Provide adequate passages, staircases, sanitary units, parking, lawn etc. as per bye laws.</p> <p>Plot size: 30 m × 32 m. Bungalow is (G+ 1) RCC framed structure.</p>	15	2,3	3,4
	Draw Ground Floor plan. Draw a frontal elevation for Que. 1 (a).			

Q.2	Draw a site plan and give area statement showing calculations for carpet area and F.S.I. for the structure you have planned in Que.1 .	10	1,2	1,2
	Draw a Furniture & electricity plan for the data given in Que.1 .	10	2,3	02
Q.3	Draw a cross sectional elevation passing through the stair, a door & window and a sanitary unit for the structure you has planned in Que.1 .	20	2,3	3,4
Q.4	Write a short note on 'Green Building & its LEEDS Certification'.	10	1,2	2
	Explain in brief the principles of planning used in planning of Public buildings.	10	1,2	
Q.5	Design and draw plan of a Half turn staircase for complex having a Floor Height 3.2 m. And the stair hall measures 3m × 4m.	10	2,3	3,4
	Write a Short note on: GRIHA & IGBC	10	1,2	2
Q.6	Explain the importance of building bylaws & National Building Code.	10	1,2	
	What do you mean by Perspective Drawing? Explain its principles & objectives & types?	10	04	07
Q.7	Draw the Foundation plan with detailed section of the foundation for the structure you have planned in Que.1 .	20	2,3	3,4



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End Semester Examination - May 2018

Max. Marks: 100

Class: S. Y. B. Tech.

Name of the Course:

Semester: IV

Structural Analysis-I

Duration: 3 Hours

Program: BTech (Civil)

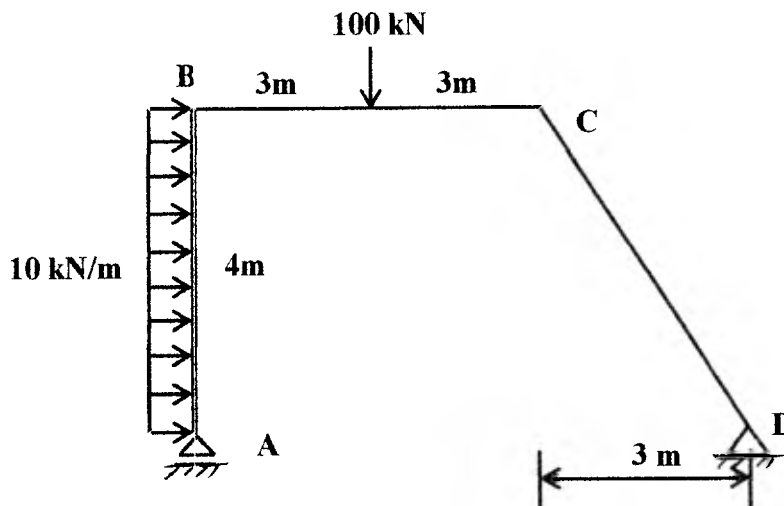
Course Code : **BTC228**

Instructions:

- Attempt any FIVE questions out of SEVEN questions.
- If there are sub questions, answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.

Question No	Max Marks	Course Outcome Number	Module No.
Q.1 (a)	(14)	1	1

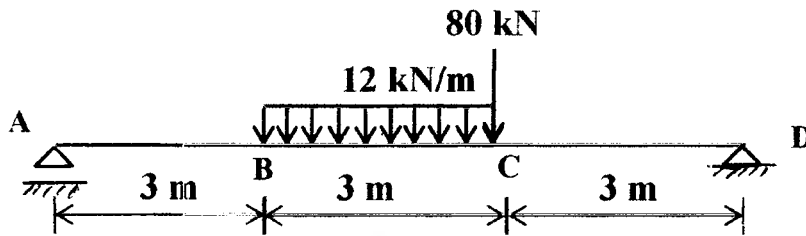
For the frame loaded as shown in figure below
a) Find the support reactions
b) Draw AFD, SFD & BMD



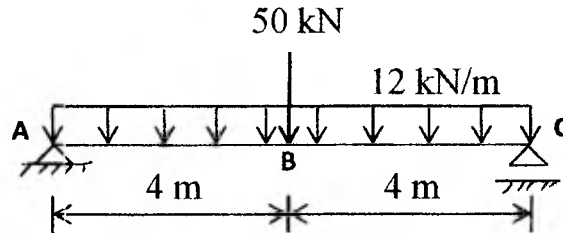
Q.1 (b)	(06)	1	2
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Write the expression for strain energy stored in a member due to
(i) Axial force
(ii) Bending Moment
(iii) Shear Force
(iv) Twisting Moment
Explain the terms involved in each expression

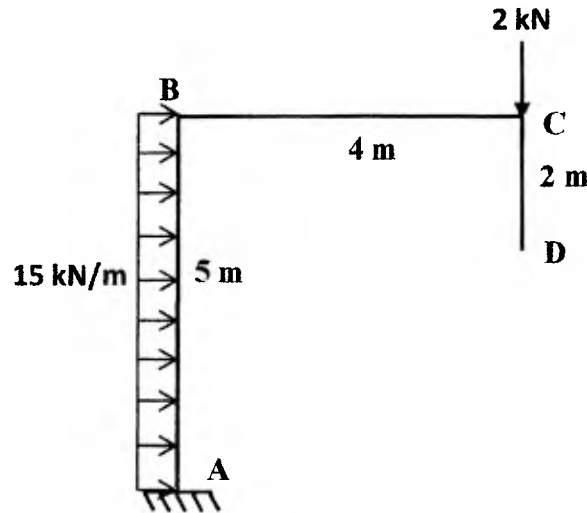
- Q.2 (a) Find the slope at A and vertical deflection at B for the beam supported and loaded as shown in figure below. Use moment area method only. (10) 2 3



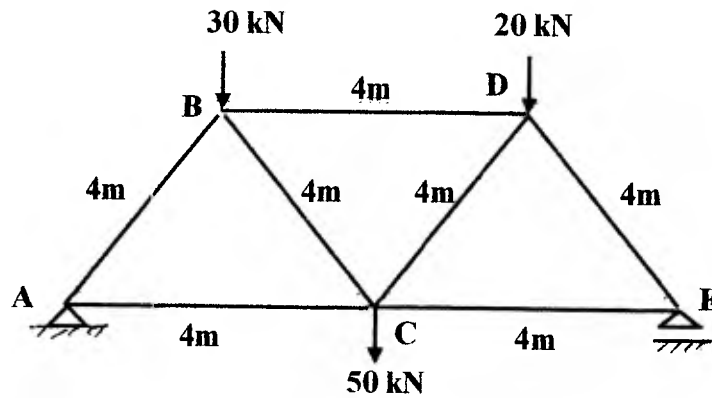
- Q.2 (b) Find the slope at A and vertical deflection at B for the beam supported and loaded as shown in figure below. Use conjugate beam method only. (10) 2 3



- Q.3 (a) Determine the vertical deflection of point D of the rigid jointed frame loaded as shown in figure below. (08) 2 3



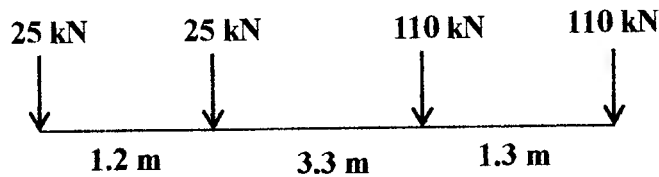
- Q.3 (b) For the pin jointed frame loaded as shown in figure below, find the vertical deflection of joint C. (12) 2 3



- Q.4 (a) A symmetrical three hinged parabolic arch of span 24 m and central rise of 4 m is subjected to a udl of 25 kN/m on the left half horizontal span of the arch and a concentrated load of 160 kN at 8 m from the right support. (15) 4 5
Determine
(a) the support reactions
(b) radial shear, normal thrust and BM just to the left of 160 kN load
(c) draw BMD
- Q.4 (b) (i) What are the limitations of Euler's formula for buckling load of a column? Explain. (02) 5 7
(ii) What are the factors on which the buckling load of a long column depends on? (03) 5 7
- Q.5 A suspension cable of span 100 m and a central dip of 8 m is supporting a three hinged stiffening girder. The third hinge of the girder is just below the lowest point C of the cable. The dead load of the girder is 12 kN/m. The girder is subjected to a point load of 180 kN at a distance of 30 m from the left support A and another point load of 240 kN at a distance of 20 m from the right support B. (20) 4 6
(a) Determine the maximum and minimum tension in the cable and mention the locations of maximum and minimum tension.
(b) Draw SFD and BMD for the girder.
If the suspension cable at B passes over a smooth pulley on the top of a pier of height 20m and the anchor cable is at 50° to the horizontal, find the forces transmitted to the base of the pier.

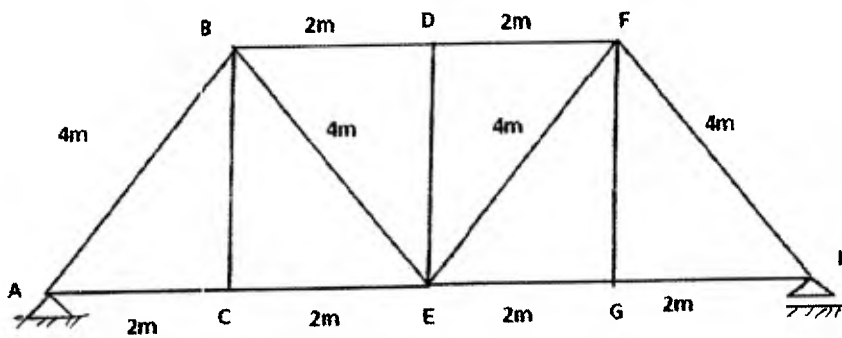
- Q.6 (a) For a simply supported beam of span 30 m draw influence diagram for (10) 3 4
 a) shear force at a section C, 12 m from left support A
 b) bending moment at a section C, 12 m from left support A
 If a udl of intensity 25 kN/m of length 8m traverses the beam find
 i) maximum positive SF at section C
 ii) maximum BM at section C

- Q.6 (b) The load system shown in figure below crosses a simply supported (10) 3 4
 girder of span 24 m. Determine the value of absolute maximum bending
 moment anywhere in the girder.



- Q.7 (a) Compare the crippling loads given by Euler's and Rankine's formulae (10) 5 7
 for a steel column 5.0 m long with one end fixed and the other end
 hinged (pinned). The cross section of the column is a symmetrical I
 section with the following dimensions.
 Top and bottom Flange width = 200 mm,
 Top and bottom Flange thickness = 15 mm,
 Depth of web = 350 mm, Thickness of web = 25 mm.
 Take $E = 2 \times 10^5 \text{ N/mm}^2$, $f_c = 350 \text{ MPa}$ and
 Rankine's constant = $1/7000$.

- Q.7 (b) For the pin jointed frame shown in figure below draw influence (10) 3 4
 diagram for axial force in members DF, EF and EG.





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END SEMESTER EXAM MAY-2018



Max. Marks: 100

Class: S.Y.B.Tech

Name of the Course: Building Design & Drawing

Semester: IV

Duration: 4 Hrs

Program: Civil Engineering

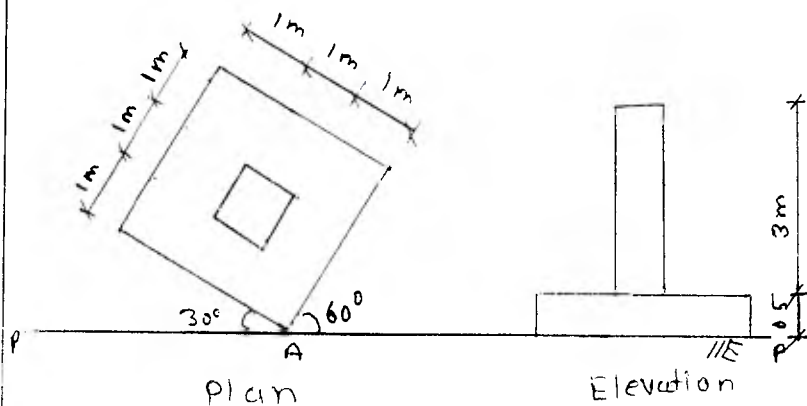
Course Code : BTC 231

Instructions:

1. Question no 1 is compulsory & attempt any four out of remaining six questions.
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.
4. Answer the theory questions and drawing questions on sheet.

Question No		Maximum Marks	Course Outcome Number	Module no.
Q1	A) Draw to a suitable scale a double line plan of single storey bungalow opening on a plot of size 18 m X 22 m. Provide suitable accommodation with following units: <ul style="list-style-type: none">• Kitchen cum dining room• Master Bed room• Children bed room• Hall Provide adequate sanitary units, passage, verandah, store room etc. A staircase for access to terrace is to be provided.	10	2,3	2,3,4
	B) Draw a front elevation for Q.1.(A)	10	3,4	3,4
Q2	A) Draw a typical cross-section of Q.1.(A) showing all structural details from foundation to parapet wall. (Note: Section line should pass through staircase)	15	3	2
	B) What are the different planning principles considered while preparing a plan for Q.1.(A).	05	3	3,4
Q3	A) Explain the importance of FSI & FAR in area statement of the building. Also calculate it for Q.1.(A).	10	1	2
	B) What is the importance of site plan in building design & drawing? Draw a site plan for Q.1.(A), if the road width is 6.5 m.	10	2	4
Q4	A) Write at least five points describing about the site selection criteria for : <ul style="list-style-type: none">• Hospital Building• Market Building	10	2,3	3

	B) Differentiate between : <ul style="list-style-type: none"> Working drawing & Submission drawing Site plan & layout plan 	10	2,3	1,4
Q.5.	A) Draw a single line plan of single storied RCC of Bank building in a district place showing various units in it. Also write schedule of door and windows of the same.	15	3,4	3,4
	B) What are the different planning principles considered while preparing a plan for Q.5.(A).	05	3	3,4
Q.6.	A) What is Green building & its principles? Explain its advantages over other types of building. Also explain its certification criteria are given by GRIHA or LEED or IGBC.	10	1,3	2
	B) Draw to a suitable scale a line plan of single storied primary school building, indicating position of openings for 200 students.	10	1,3	2,3,4
Q.7	A) Following figure shows plan & elevation of a pedestal. Corner A touches the picture plane and observer is exactly opposite the corner at 5 m distance, eye level is 1.5 m. Draw a two-point perspective with 30-60 angles.	12	3,4	7
	B) Define: Perspective Drawing & various terms used in perspective drawing. Explain necessity of perspective drawing. Explain the difference between one point & two point perspectives.	08	3,4	7





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Final Examination
May 2018

Max. Marks: 100

Class: S. Y. B. Tech

Semester: IV

Name of the Course: **Concrete Technology**

Duration: 3 Hours

Program: B. Tech in Civil Engineering

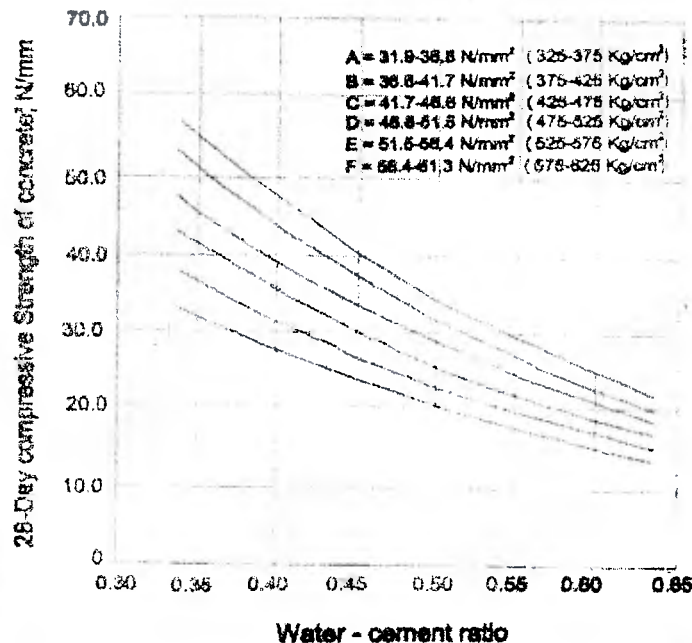
Course Code: **BTC230**

Instructions:

- Answer any 5 questions out of 7.
- Figures to the right indicate full marks.
- Assume suitable data, if necessary and state the same clearly.

Question No	Question	Max Marks	Course Outcome Number	Module No.
Q.1	a. Explain the phenomenon of alkali silica reaction and how to mitigate it.	10	1	2
	b. What are different tests conducted for assessing the workability of concrete. Explain any one test in detail.	5	1	2
	c. For each given situation below, suggest the type of admixture to be used in concrete: 1. Increase workability of concrete, without increasing the w/c ratio. 2. Change the air content from 1% to 3% in concrete 3. Reduce capillary pores in concrete 4. Keep workability constant for 4 hours 5. Reduce setting time of concrete from 12 hours to 8 hours	5	3	2
Q.2	a. What is High Performance Concrete? Discuss advantages of HPC over ordinary concrete.	8	3	4
	b. List out the salient requirement of HPC.	7	3	4
	c. Differentiate between High Performance Concrete and High strength concrete.	5	3	4
Q.3	a. Explain briefly following types of cements and their use. a. Ordinary Portland Cement b. Sulphate Resistant Cement	10	1	1
	b. What is bleeding and segregation in concrete? How can it be controlled?	5	1	2
	c. Define aggregates. Describe briefly 3 characteristics of aggregate which affect concrete properties.	5	1	1
Q.4	Based on data given below 1. Design concrete for M35 grade using guidelines given in IS 10262 2. Do the moisture correction of aggregate and calculate the final mix proportions. Grade of concrete – M35 Type of cement – OPC 53 28 days strength of cement – 60 MPa Standard deviation of concrete achieved – 4 MPa Maximum size of aggregate – 20 mm Exposure condition Piles constructed in sea bed	20	2	3

Workability – 180 mm
 Method of placement – Pump
 Specific gravity of coarse aggregate – 2.68
 Specific gravity of fine aggregate (Zone II) – 2.62
 Type of coarse aggregate – angular coarse aggregate
 Admixture used with 30% water reduction capacity
 Water absorption of coarse aggregate – 0.65%
 Water absorption of fine aggregate – 1.8%
 Total moisture content in coarse aggregate – 0.3%
 Total moisture content in fine aggregate – 3.0%
 Consider use of 30% Fly Ash as replacement of cement



Moderate	Concrete continuously under water
Severe	Concrete completely immersed in sea water
Very severe	Concrete in contact with or buried under aggressive sub-soil/ground water
Extreme	Surface members in tidal zone

Exposure	Min. cement content kg/m ³	Max. w/c ratio
Moderate	300	0.5
Severe	320	0.45
Very severe	340	0.45
Extreme	360	0.4

Q.5	a.	Explain briefly the layout of batching plant at site. Explain different components of batching plant and their utility.	10	3	5
	b.	What are the advantages and disadvantages of ready mix concrete?	5	3	5
	c.	Explain any five methods for transportation of concrete.	5	3	5
Q.6	a.	Define Non-Destructive Testing of concrete. Explain with a neat sketch.	10		7
	b.	Explain in detail Half Cell Potentiometer.	10		7
Q.7	a.	Explain any four types of repair methods in brief.	10		6
	b.	Explain any two types of strengthening techniques for concrete beam or column giving the method, advantages and disadvantages.	10		6



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Re- Examination, June- 2018



Max. Marks: 100
Class: S.Y.B.Tech. Semester: IV
Name of the Course: Surveying-II

Q. P. Code:
Duration: 3 hour
Program: Civil
Course Code : BTC- 227

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. 1 (solve any four from a to f)		Maximum Marks	C.O.	Mod.																			
Q1	(a) What are the requirements of Base line?	05	C.O.1	6																			
	(b) Derive an expression for superelevation.	05	C.O.1	2																			
	(c) How would you transfer alignment inside the tunnel?	05	C.O.3	7																			
	(d) Write note on Subtense bar.	05	C.O.4	5																			
	(e) Discuss instruments used in Precision levelling.	05	C.O.3	4																			
	(f) Explain degree of curve.	05	C.O.3	1																			
Q2	(a) In a Tacheometric Survey made with a tacheometre whose constants are $K=100$ & $C=0.50$. Staff was kept vertical to the line of sight for each readings. (RL of Q =135.60 m). Determine RL of A, M and B.M.? <table border="1" data-bbox="370 1333 1075 1505"> <thead> <tr> <th>Inst.Stⁿ</th> <th>Staff Stⁿ</th> <th>H.I.</th> <th>Vertical angle</th> <th>Stadia Reading</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>BM</td> <td rowspan="2">1.310</td> <td>+4° 30'</td> <td>0.965, 1.350, 1.735</td> </tr> <tr> <td>Q</td> <td>Q</td> <td>+5° 10'</td> <td>1.205, 1.320, 1.435</td> </tr> <tr> <td>Q</td> <td>M</td> <td>1.420</td> <td>-7° 40'</td> <td>0.835, 1.060, 1.285</td> </tr> </tbody> </table>	Inst.St ⁿ	Staff St ⁿ	H.I.	Vertical angle	Stadia Reading	A	BM	1.310	+4° 30'	0.965, 1.350, 1.735	Q	Q	+5° 10'	1.205, 1.320, 1.435	Q	M	1.420	-7° 40'	0.835, 1.060, 1.285	10	C.O.1	5
	Inst.St ⁿ	Staff St ⁿ	H.I.	Vertical angle	Stadia Reading																		
A	BM	1.310	+4° 30'	0.965, 1.350, 1.735																			
Q	Q		+5° 10'	1.205, 1.320, 1.435																			
Q	M	1.420	-7° 40'	0.835, 1.060, 1.285																			
	(b) Explain in detail the procedure for setting out Sewer line with neat sketch.	10	C.O.4	6																			
Q3	(a) A gradient of -1.8% meets a gradient of $+2.1\%$ at a chainage of 1250 m and elevation of 201m. A vertical curve of length 200 m is to be set out with pegs at 20m interval. Calculate the elevation of all points by any method of your choice?	12	C.O.1	2																			
	(b) Derive an expression for the horizontal distance and elevation of staff station by tangential system when both the points are at angle of depression.	08	C.O.1	5																			

Q4	(a) Highway curve having a deflection angle of 85° is to be desired for a maximum speed of 80 km/hr, a maximum centrifugal ratio of $\frac{1}{4}$ and a minimum rate of change of radial acceleration of $0.3 \text{ m/sec}^2/\text{sec}$. the combined curve consist of two cubic spirals and a circular curve. Calculate (i) The radius of the circular curve, (ii) The length of the cubic spiral (iii) The total length of the combined curve and (iv) The chain ages of all salient points if the chain age of the point of intersection is 2550m.	12	C.O.1	2
	(b) Describe in details precautions to be taken during precision levelling.	08	C.O.1	4
Q5	(a) A compound curve is to connect two straights having deflection angle of 78° . The lengths of two tangents are 215 m & 245 m respectively. Calculate the length of two arcs, if the radius of the first curve is to be 210 m. Also calculate the chainages of point of Tangency if that of point of intersection is 1200 m.	10	C.O.1	2
	(b) Explain in detail procedure for Two Theodolite method of setting simple curve.	10	C.O.3	1
Q6	(a) Derive an expression for the spiral angle.	05	C.O.1	2
	(b) Discuss in detail field work for carrying out radial contouring.	08	C.O.4	5
	(c) What is total station? Discuss advantages of total station?	07	C.O.3	3
Q7	Write short notes on the following (any four):			
	(i) Transfer of RL inside tunnel	05	C.O.4	6
	(ii) Tacheometric plane Tabling	05	C.O.3	5
	(iii) Trilateration	05	C.O.1	7
	(iv) Electronic Theodolite	05	C.O.1	4
	(v) Global positioning System	05	C.O.4	4
(vi) Types of transition curve	05	C.O.1	2	



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Re- Examination
JUNE 2018

Maximum Marks: 100

Class: S.Y.B.Tech

Name of the Course: Probability and Statistics

Semester: IV

Duration: 3 hours

Program: Civil Engineering

Course Code : BTC226

Instructions:

1. **Question No.1 is compulsory.** Attempt any four from remaining six questions.
2. Attempt Questions serially and answers to all sub questions should be grouped together.
3. Write complete answers with formulas and statement of theorems used.
4. Use of programmable calculator is prohibited.
5. If you attempt more questions, specify which five (Including Q.1) should be graded. Otherwise, by default, only the first five will be graded.

Q		Marks	CO	Module												
1(a)	Let X be a continuous random variable with probability density function $f(x) = \begin{cases} Ke^{-3x}, & x > 0 \\ 0 & x \leq 0 \end{cases}$ Find (i) K (ii) $P(1 \leq X \leq 2)$ (iii) mean (iv) variance	6	1	3												
(b)	Evaluate $\int_C \sqrt{3x+x^2} dx - x^2 y dy$, where C is the triangle with vertices (0,0), (0,1) and (2,1) oriented clockwise.	6	2	1												
(c)	Solve the following problems by the simplex method Maximize $Z = 4x_1 + 3x_2 + 6x_3$ Subject to $2x_1 + 3x_2 + 2x_3 \leq 440$ $4x_1 + 3x_3 \leq 470$ $2x_1 + 5x_2 \leq 430$ $x_1, x_2, x_3 \geq 0.$	8	3	6												
2 (a)	The following table shows the amount of diesel required by a train to travel certain distances. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Distance (X km)</td> <td style="padding: 2px;">90</td> <td style="padding: 2px;">150</td> <td style="padding: 2px;">230</td> <td style="padding: 2px;">310</td> <td style="padding: 2px;">390</td> </tr> <tr> <td style="padding: 2px;">Diesel used (Y litres)</td> <td style="padding: 2px;">19.2</td> <td style="padding: 2px;">33.9</td> <td style="padding: 2px;">49.0</td> <td style="padding: 2px;">79.5</td> <td style="padding: 2px;">89.9</td> </tr> </table>	Distance (X km)	90	150	230	310	390	Diesel used (Y litres)	19.2	33.9	49.0	79.5	89.9	6	1	2
Distance (X km)	90	150	230	310	390											
Diesel used (Y litres)	19.2	33.9	49.0	79.5	89.9											

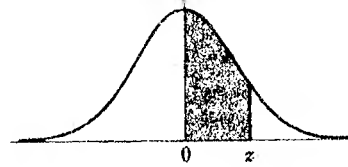
	This data can be modelled by the regression line with equation $x = ay + b$ Find the values of a and b																									
(b)	The finish times for marathon runners during a race are normally distributed with a mean of 195 minutes and a standard deviation of 25 minutes. a) What is the probability that a runner will complete the marathon within 3 hours? b) Calculate to the nearest minute, the time by which the first 8% runners have completed the marathon.	6	1	4																						
(c)	Verify Green's Theorem for $\int_C x^2 y^2 dx + (yx^3 + y^2) dy$ where C is the boundary of the triangle having vertices at (0,0), (4,2) and (4,-8)	8	2	1																						
3 (a)	Find mean and variance of Poisson's distribution.	6	1	3																						
(b)	A machinist is expected to make engine parts with axel diameter of 1.75 cm. A random sample of 10 parts shows a mean diameter 1.85 cm with standard deviation 0.1 cm. On the basis of this sample, would you say that the work of the machinist is inferior?	6	1	5																						
(c)	Evaluate $\iint_S (\nabla \times \vec{F}) \cdot \vec{ds}$ where $\vec{F} = yzi + x^2zj + xyk$ and S is the surface of the paraboloid $z = 16 - x^2 - y^2$ that lies above the plane $z = 7$	8	2	1																						
4 (a)	Solve the following problems by the simplex method Maximize $Z = 6x_1 - 2x_2 + 3x_3$ Subject to $2x_1 - x_2 + 2x_3 \leq 2$ $x_1 + 4x_3 \leq 4$ $x_1, x_2, x_3 \geq 0$.	6	3	6																						
(b)	If the light bulbs in a house fail according to a Poisson law, and over the last 20 weeks there have been 4 failures, find the probability that there will not be more than two failure next week.	6	1	3																						
(c)	Following Table shows the respective heights x and y (in inches) of a sample of 10 father and their sons. Calculate rank correlation coefficients	8	1	2																						
	<table border="1"> <tr> <td>X</td> <td>65</td> <td>63</td> <td>67</td> <td>64</td> <td>68</td> <td>62</td> <td>70</td> <td>66</td> <td>68</td> <td>71</td> </tr> <tr> <td>Y</td> <td>68</td> <td>66</td> <td>68</td> <td>65</td> <td>69</td> <td>66</td> <td>68</td> <td>65</td> <td>71</td> <td>70</td> </tr> </table>	X	65	63	67	64	68	62	70	66	68	71	Y	68	66	68	65	69	66	68	65	71	70			
X	65	63	67	64	68	62	70	66	68	71																
Y	68	66	68	65	69	66	68	65	71	70																

5 (a)	An ambulance service claims that it takes on an average 10.5 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 60 emergency calls, getting a mean of 12.7 minutes with standard deviation of 1.8 minutes. What can they conclude at the level of significance $\alpha = 0.05$?	6	1	5												
(b)	The equations of the lines of regression are $3x + 2y = 26$, $6x + y = 31$ Find \bar{x} , \bar{y} and r	6	1	2												
(c)	The download time of a resource web page is normally distributed with a mean of 6.5 seconds and a standard deviation of 2.3 seconds. (i) What proportion of page downloads take more than 8 seconds? (ii) What is the probability that the download time will be between 5 and 9 seconds? (iii) How many seconds will it take for 40% of the downloads to be completed?	8	1	4												
6(a)	Two independent samples from normal population with equal variance gave the following results <table border="1" data-bbox="347 1072 981 1213"> <thead> <tr> <th>Sample</th> <th>Size</th> <th>Mean</th> <th>S.D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>16</td> <td>23.4</td> <td>2.5</td> </tr> <tr> <td>2</td> <td>12</td> <td>24.9</td> <td>2.8</td> </tr> </tbody> </table> Is the difference between the mean significant?	Sample	Size	Mean	S.D	1	16	23.4	2.5	2	12	24.9	2.8	6	1	4
Sample	Size	Mean	S.D													
1	16	23.4	2.5													
2	12	24.9	2.8													
(b)	In a restaurant an average of 3 out of every 7 customers ask for water with their meal. A random sample of 12 customer is selected. Find the probability that (i) exactly 5 customers ask for water with their meal, (ii) less than 10 customers ask for water with their meal.	6	1	3												
(c)	If x and y are two correlated variables with the same standard deviation and having coefficient of correlation r . Show that the correlation coefficient between x and $x - y$ is $\sqrt{\frac{1-r}{2}}$.	8	1	2												
7(a)	Use Gauss Divergence Theorem to evaluate $\iint_S \vec{F} \cdot \hat{n} ds$, where S is the surface of the cuboid with vertices $(\pm 1, \pm 2, \pm 3)$ and $\vec{F} = xz^3 \hat{i} + 2x^3 z^2 \hat{j} + z^4 \hat{k}$	6	2	1												

(b)	<p>The probability that a match will not strike is 0.009. Calculate the probability that in a box of 100 matches:</p> <p>(a) they all strike satisfactorily</p> <p>(b) at least 2 do not strike</p>	6	1	3
(c)	<p>Using big M method solve the following LPP</p> <p>Maximize $Z = 2x_1 + 3x_2 + 4x_3$</p> <p>Subject to $3x_1 + x_2 + 4x_3 \leq 600$</p> <p>$2x_1 + 4x_2 + 2x_3 \geq 480$</p> <p>$2x_1 + 3x_2 + 3x_3 = 540$</p> <p>$x_1, x_2, x_3 \geq 0.$</p>	8	3	7

Appendix C

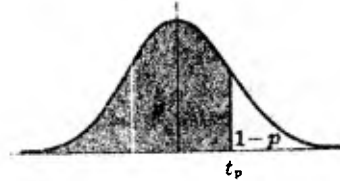
Areas
under the
Standard
Normal Curve
from 0 to z



z	0	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

Appendix D

Percentile Values (t_p)
for
Student's t Distribution
with ν Degrees of Freedom



ν	$t_{.55}$	$t_{.60}$	$t_{.70}$	$t_{.75}$	$t_{.80}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$
1	.158	.325	.727	1.000	1.376	3.08	6.31	12.71	31.82	63.66
2	.142	.289	.617	.816	1.061	1.89	2.92	4.30	6.96	9.92
3	.137	.277	.584	.765	.978	1.64	2.35	3.18	4.54	5.84
4	.134	.271	.569	.741	.941	1.53	2.13	2.78	3.75	4.60
5	.132	.267	.559	.727	.920	1.48	2.02	2.57	3.36	4.03
6	.131	.265	.553	.718	.906	1.44	1.94	2.45	3.14	3.71
7	.130	.263	.549	.711	.896	1.42	1.90	2.36	3.00	3.50
8	.130	.262	.546	.706	.889	1.40	1.86	2.31	2.90	3.36
9	.129	.261	.543	.703	.883	1.38	1.83	2.26	2.82	3.25
10	.129	.260	.542	.700	.879	1.37	1.81	2.23	2.76	3.17
11	.129	.260	.540	.697	.876	1.36	1.80	2.20	2.72	3.11
12	.128	.259	.539	.695	.873	1.36	1.78	2.18	2.68	3.06
13	.128	.259	.538	.694	.870	1.35	1.77	2.16	2.65	3.01
14	.128	.258	.537	.692	.868	1.34	1.76	2.14	2.62	2.98
15	.128	.258	.536	.691	.866	1.34	1.75	2.13	2.60	2.95
16	.128	.258	.535	.690	.865	1.34	1.75	2.12	2.58	2.92
17	.128	.257	.534	.689	.863	1.33	1.74	2.11	2.57	2.90
18	.127	.257	.534	.688	.862	1.33	1.73	2.10	2.55	2.88
19	.127	.257	.533	.688	.861	1.33	1.73	2.09	2.54	2.86
20	.127	.257	.533	.687	.860	1.32	1.72	2.09	2.53	2.84
21	.127	.257	.532	.686	.859	1.32	1.72	2.08	2.52	2.83
22	.127	.256	.532	.686	.858	1.32	1.72	2.07	2.51	2.82
23	.127	.256	.532	.685	.858	1.32	1.71	2.07	2.50	2.81
24	.127	.256	.531	.685	.857	1.32	1.71	2.06	2.49	2.80
25	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.79
26	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.78
27	.127	.256	.531	.684	.855	1.31	1.70	2.05	2.47	2.77
28	.127	.256	.530	.683	.855	1.31	1.70	2.05	2.47	2.76
29	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.76
30	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.75
40	.126	.255	.529	.681	.851	1.30	1.68	2.02	2.42	2.70
60	.126	.254	.527	.679	.848	1.30	1.67	2.00	2.39	2.66
120	.126	.254	.526	.677	.845	1.29	1.66	1.98	2.36	2.62
∞	.126	.253	.524	.674	.842	1.28	1.645	1.96	2.33	2.58

Source: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd, Edinburgh), and by permission of the authors and publishers.



Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
END SEMESTER EXAM MAY-2018



Max. Marks: 100

Class: S.Y.B.Tech

Semester: IV

Name of the Course: Fluid Mechanics

Duration: 3 Hrs

Program: Civil Engineering

Course Code : BTC229

Instructions:

1. Question no 1 is compulsory & attempt any four out of remaining six questions.
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

Question No		Maximum Marks	Course Outcome Number	Module no.
Q1	Write a short note on the following terms (any four) 1. Viscosity. 2. Metacentric Height. 3. Siphon Spillway. 4. Bourdon's pressure guage. 5. Rectangular Notch. 6. Relative Equilibrium.	20	1,2,3	1-7
Q2	A) Derive expression for Total pressure & Centre of pressure, when it acts on Vertical plane surface under fully submerged conditions.	08	2	2
	B) A triangular plate of height 2.5 m and base 1.4 m is submerged in an oil of sp. Gravity 0.85 in such way that its plane makes an angle 45 degree with free surface of oil. The base of the plate is parallel to the oil surface and at a depth 1.3 m below the oil surface. Find the Total pressure force on plate & position of centre of pressure.	06	2	2
	C) State & Prove Hydrostatic law when fluid is at rest.	06	2	2
Q3	A) Explain the following terms with sketches. 1. Pathline. 2. Streamline 3. Streakline 4. Stream tube	08	1	3
	B) Define Continuity equation & also derive Continuity equation in Cartesian co-ordinate system.	06	1	3
	C) A Water flows through pipe AB 1.2 m diameter at 2.5 m/sec & then pass through a pipe BC 1.5 m diameter. At c, the pipe branches into CD & CE. The branch CD is 0.8 m diameter & carries one-third flow in AB. The flow velocity in branch CE is 2.0 m/sec. find the volume rate of flow in AB & also velocity in BC & CD?	06	1	3
Q4	A) Derive an expression of hydraulic coefficients for sharp edged orifices discharging free.	08	1	4

	B) What are the advantages of triangular notch over the rectangular notch?	06	1	4
	C) Explain the difference between notch & weir with sketches. Why ventilation is provided in the notch?	06	1	4
Q.5.	A) A 4 cm diameter orifice in the vertical side of the tank discharges water. The water surface in the tank is at constant level of 2 m above the centre of orifice. A fluid jet has diameter of 3.25 cm at its vena-contracta. The measured discharge is 5 lit/sec. determine C_c, C_v & C_d for the orifice?	06+06	1 & 2	5
	B) The left limb of a U- Tube mercury manometer is connected to a pipe line conveying water, the level of mercury in the limb being 0.75 m below the centre of pipe line and the right leg is open to atmosphere. The level of mercury in right limb is 0.60 m above that in left limb and the space above mercury in the right limb contains benzene (sp.gravity 0.88) to a height of 0.45 m. find the pressure in the pipe.			
	C) Discuss the following cases of Ideal flow with their equation of stream & velocity potential function. A) Uniform flow B) source flow	08	1 & 2	5
Q.6.	A) Write a short note on Mach number. And also explain a) Mach Cone with all three possible cases. b) Mach Angle	08	3	6
	B) Explain any five classifications of fluid flows.	06	3	6
	C) Find the mach number when an aircraft is flying at 1200 km/hr through still air having pressure of 90 KN/m ² & temperature of -8°C. Take R= 287.14 J/Kg.K. Calculate the pressure,density & temp at stagnation point. Take K= 1.4	06	3	6
Q.7	A) A rectangular tank 2.5 m wide, 3.0 m long & 3.5 m deep contains water to depth of 2.0 m. find the horizontal acceleration which may be imparted to the tank in the direction of its length so that (a) there is no spilling of water from the tank (b) the front bottom corner of the tank is just exposed (c) the bottom of tank is exposed up to its mid-point. Calculate the volume of water that would spill out from the tank in case of (b) & (c) Also calculate the total forces on each end of the tank in each of the cases & show that difference between the forces equals the unbalanced force necessary to accelerate the liquid mass in the tank.	12	3	7
	B) Derive an expression for fluid masses subjected to acceleration with inclined plane.	04	3	7
	C) In above tank (refer Q.7.A), if oil is filled upto total height of tank. Find the force acting at side of the tank when 1) Vertical acceleration is 5.0 m/s ² acts upward 2) Vertical acceleration is 5.0 m/s ² acts downward	04	3	7