

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO.

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LEVEL :- FIFTH PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEF506

COURSE NAME :- ENVIRONMENTAL ENGINEERING

MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 25/06/2022

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No.. SQN-Sub Question No. R- Remembering. U- Understanding. A- Application.

SECTION - I

QN	S Q N		R/ U/ A	Co CEF 506	Mar ks
Q.1		Attempt any FOUR :			08
	a)	Enlist any four factors governing location of intake.	R	1	
	b)	Enlist an four factors affection rate of demand.	R	2	
	c)	Give water consumption breakup of domestic water demand in an Indian city.	U	2	
	d)	What is necessity of low cost water treatments.	R	4	
	e)	Enlist any two merits and two demerits of radial distribution system.	R	5	
	f)	Enlist different types of pipes used for distribution system.	R	5	
Q.2		Attempt any FOUR :			16
	a)	Explain reservoir intake also draw a neat sketch.	U	1	
	b)	What is necessity of ground water recharging and enlist any two advantages of it.	A	1	
	c)	Explain i) Fire demand ii) Per capita Demand	A	2	
	d)	Enlist various chemical tests conducted on water and explain any one.	F	3	
	e)	Explain total count of bacteria test.	U	3	
	f)	Explain Jar test for optimum coagulant dose.	U	4	
Q.3		Attempt any FOUR :			16
	a)	Explain theory of filtration.	U	4	
	b)	Enlist different forms of chlorination and state the objects of disinfection.	A	4	
	c)	Explain principle of sedimentation with coagulation .	A	4	
	d)	Explain back washing process of rapid sand filter.	A	4	
	e)	Explain the procedure of laying and testing of pipe line	U	5	
	f)	Enlist methods of distribution system of water and explain any one with neat sketch.	A	5	

SECTION - II

QN	S Q N		R/ U/ A	Co CEF 506	Mar ks
Q.4		Attempt any FOUR :			08
	a)	State the necessity of sanitation.	R	6	
	b)	Define hazardous waste.	R	8	
	c)	Define i) Dry refuse ii) Bacteria	R	8	
	d)	State the purpose of manhole.	U	9	
	e)	Enlist the methods of carrying refuse.	R	9	

Q.5	f)	Define COD.		R	10	16
		Attempt any FOUR :				
	a)	State the objects of sewage disposal.		U	6	
	b)	Define the terms: i) Waste pipe. ii) Soil pipe. iii) Vent pipe. iv) Rain water pipe.		R	7	
	c)	State any eight principles of house drainage.		R	7	
	d)	Explain the methods of collection of solid waste.		U	8	
Q.6	e)	Explain the characteristics of sewage.		U	10	16
	f)	Differentiate between oxidation pond and oxidation ditch.		U	11	
		Attempt any FOUR :				
	a)	Explain with sketch two pipe system of plumbing.		U	7	
	b)	State advantages and disadvantages of conservancy method.		R	9	
	c)	State any four factors to be considered while designing the sewers.		R	9	
	d)	Draw a sketch of manhole with approximate dimension and label it.		U	9	
	e)	Explain the purpose of grit chamber state its location.		U	11	
	f)	Sketch a trickling filter and explain its working.		U	4	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- **THIRD**

PROGRAM : **CIVIL ENGINEERING**

COURSE CODE :- **CEF310/1208**

COURSE NAME **TRANSPORTATION ENGINEERING (RBR)**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **25/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S Q N	Question Text	R/ U/ A	Co EFF 310	Ma rks
Q.1		Attempt any FOUR :			08
	a)	State the factors affecting alignment of road.	R	1	
	b)	Define sight distance.	R	2	
	c)	Define flexible pavement.	R	3	
	d)	State any two disadvantages of concrete roads.	U	3	
	e)	Define tunnel.	R	4	
	f)	Define tunnel surveying.	R	5	
Q.2		Attempt any FOUR :			16
	a)	State the importance of transportation in national development.	U	1	
	b)	Define camber. State any four purposes of camber.	R	2	
	c)	State any four objectives of providing super-elevation.	R	2	
	d)	Differentiate any eight points between flexible pavement and rigid pavement.	U	3	
	e)	Draw a neat sketch showing component parts of WBM road and explain in brief construction procedure followed for W.B.M. road	A	3	
	f)	State four purposes of tunnel lining.	U	6	
Q.3		Attempt any FOUR :			16
	a)	Draw a neat labelled sketch of road in cutting.	A	2	
	b)	Explain in brief construction procedure of cement concrete road.	U	3	
	c)	State the reasons for providing joints in cement concrete road.	U	3	
	d)	State any four disadvantages and any four advantages of tunnel.	R	4	
	e)	Explain the method of transferring the centre line from the ground through a shaft.	A	5	
	f)	Explain full face method of tunneling in hard rock.	A	6	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) Define Permanent way. List the component parts of it/	R	7	
	b) Define points and crossings.	R	8	
	c) Enlist any four points for site selection of stations.	U	9	
	d) List any four factors affecting site selection for bridges.	R	10	
	e) List the types of bearings for R.C.C. bridges.	R	11	
	f) State classification of bridges according to purpose.	U	12	
Q.5	Attempt any FOUR :			16
	a) Define creep of rails and state any four causes of creep.	A	7	
	b) List the various types of Rail fixture and fastenings and explain any two with neat sketch.	U	7	
	c) Draw a neat labelled sketch of a left hand turn outs.	A	8	
	d) State the various types of crossings and explain any one.	U	8	
	e) List the classification of yards and explain any one in detail.	U	9	
	f) State the classifying railway stations according to operational characteristic and describe any one.	R	9	
Q.6	Attempt any FOUR :			16
	a) State any four advantages and disadvantages of concrete sleepers.	A	7	
	b) State the different types of rails and explain any one with neat sketch.	U	7	
	c) Enlist any eight functions of Ballast.	R	7	
	d) Enlist and describe any four functions of bridge foundation.	U	11	
	e) State the different types of approaches and explain any one with neat sketch.	A	11	
	f) List any four advantages and disadvantages of R.C.C. girder bridge.	A	12	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **THIRD PROGRAM : CIVIL ENGINEERING**

COURSE CODE :- **CEG309/CEF309**

COURSE NAME **SURVEYING II**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **25/06/2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No.. SQN-Sub Question No. R- Remembering. U- Understanding. A- Application.

QN	S		R/	Co	Mar																																		
	Q		U/	CEG	ks																																		
	N		A	306																																			
Q.1		Attempt any FOUR :			08																																		
a)		Enlist the types of theodolites.	R	1	2																																		
b)		Define swinging and face left.	R	1	2																																		
c)		Define latitude with required formula.	R	1	2																																		
d)		State transit rule with meaning of terms.	R	1	2																																		
e)		Define tachometry.	R	2	2																																		
f)		State the formulae to calculate horizontal & vertical distance in tachometry.	R	2	2																																		
Q.2		Attempt any FOUR :			16																																		
a)		Explain temporary adjustments of a theodolite.	U	1	4																																		
b)		Explain the procedure for measurement of vertical angle.	U	1	4																																		
c)		Enlist any four components of theodolite with their functions.	U	1	4																																		
d)		Explain the procedure of repetition method.	U	1	4																																		
e)		The co-ordinates of points A & B are as follows.	R	3	4																																		
		<table><tr><th rowspan="2">Point</th><th colspan="2">Co-ordinates</th></tr><tr><th>North</th><th>East</th></tr><tr><td>A</td><td>826.70</td><td>635.40</td></tr><tr><td>B</td><td>1040.60</td><td>960.30</td></tr></table>	Point	Co-ordinates		North	East	A	826.70	635.40	B	1040.60	960.30																										
Point	Co-ordinates																																						
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A	826.70	635.40																																					
B	1040.60	960.30																																					
		Calculate length & bearing of line AB.																																					
f)		Following are the length and bearing of traverse.	A	1	4																																		
		<table><tr><th>Line</th><th>Length in mm</th><th>Bearing</th></tr><tr><td>AB</td><td>260</td><td>30°</td></tr><tr><td>BC</td><td>325</td><td>140°</td></tr><tr><td>CD</td><td>185</td><td>210°</td></tr></table>	Line	Length in mm	Bearing	AB	260	30°	BC	325	140°	CD	185	210°																									
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CD	185	210°																																					
Q.3		Attempt any FOUR :			16																																		
a)		Explain the sources of errors in theodolite surveying.	U	1	04																																		
b)		Calculate the corrected consecutive co-ordinates for the following observations using Bowditch rule.	A	1	04																																		
		<table><tr><th rowspan="2">Line</th><th rowspan="2">length in (m)</th><th colspan="4">Consecutive co-ordinates</th></tr><tr><th>N</th><th>S</th><th>E</th><th>W</th></tr><tr><td>AB</td><td>250</td><td>107.97</td><td></td><td>3.77</td><td></td></tr><tr><td>BC</td><td>123</td><td>14.39</td><td></td><td>249.57</td><td></td></tr><tr><td>CD</td><td>256</td><td></td><td>122.94</td><td>4.12</td><td></td></tr><tr><td>DA</td><td>108</td><td>0</td><td></td><td></td><td>256.00</td></tr></table>	Line	length in (m)	Consecutive co-ordinates				N	S	E	W	AB	250	107.97		3.77		BC	123	14.39		249.57		CD	256		122.94	4.12		DA	108	0			256.00			
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c)		Explain the field work of tachometric survey.	U	2	04																																		
d)		State the procedure of any one method of calculating tachometric constants.	U	2	04																																		

e)	The staff intercepts for distance 60m was 0.595m and for distance 90m it was 0.905m. calculate tachometric constants. The staff was held vertical and line of sight was horizontal.	A	2	04																	
f)	A tachometer was fitted with anallatic lens used to take following observations: <table><tr><td>Inst Stⁿ.</td><td>Staf f stⁿ</td><td>HI (m)</td><td>Vertical angle</td><td>Staff readings (m)</td><td>Remark</td></tr><tr><td rowspan="2">P</td><td>BM</td><td>1.42</td><td>+7° 15'</td><td>0.750, 1.500, 2.250</td><td>RL of BM=340</td></tr><tr><td>Q</td><td>1.42</td><td>-3° 42'</td><td>1.500, 1.800, 2.100</td><td>m</td></tr></table>	Inst St ⁿ .	Staf f st ⁿ	HI (m)	Vertical angle	Staff readings (m)	Remark	P	BM	1.42	+7° 15'	0.750, 1.500, 2.250	RL of BM=340	Q	1.42	-3° 42'	1.500, 1.800, 2.100	m	A	2	04
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	Q	1.42	-3° 42'	1.500, 1.800, 2.100	m																
Q.4	Calculate RL of points P and Q. Attempt any FOUR :			08																	
a)	State the principal of plane table surveying.	R	3	02																	
b)	Define degree of curve.	R	4	02																	
c)	Enlist any four modern survey instruments.	R	5	02																	
d)	Define GIS.	R	6	02																	
e)	State various methods of plane table surveying.	R	3	02																	
f)	Enlist the types of curves used in roads and railway alignment.	U	4	02																	
Q.5	Attempt any FOUR :			16																	
a)	Define orientation and explain backsighting method of orientation with neat sketch.	U	3	04																	
b)	Explain with sketch intersection method of plane table surveying.	A	3	04																	
c)	Explain offset from long chord method of curve setting.	U	5	04																	
d)	Calculate the ordinates at 25m interval to set out a circular curve having a long chord of 300m and versed sign of 10m.	A	4	04																	
e)	State the uses of total station in surveying.	R	5	04																	
f)	State any two advantages and disadvantages of remote sensing.	U	6	04																	
Q.6	Attempt any FOUR :			16																	
a)	State the accessories required for plane table survey along with their use.	U	3	04																	
b)	State any four properties of simple circular curve.	U	4	04																	
c)	Describe the temporary adjustment of digital level.	R	5	04																	
d)	State any eight applications of GPS.	A	6	04																	
e)	Explain the steps involved in temporary adjustment of plane table.	U	3	04																	
f)	Explain the procedure for measurement of vertical angle with digital theodolite.	A	5	04																	

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EVENT TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEG308/CEF308

COURSE NAME :- SURVEYING - I

MAX. MARKS : 80 TIME : 3.45 HRS. DATE :- 24/06/2022

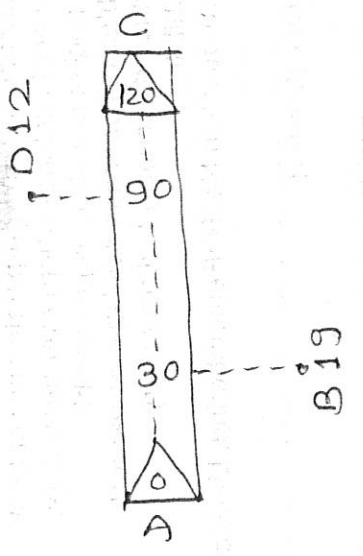
Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
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- 7) QN- Question No.. SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/ U/ A	Co TFG 308	Mar ks
Q.1	Attempt any FOUR :			08
	a) Enlist any four types of tapes.	R	1	
	b) Draw a neat sketch of arrow.	A	1	
	c) Define base line and tie line.	R	2	
	d) Define well and ill conditioned triangles.	U	2	
Q.2	e) Enlist any eight components of prismatic compass.	R	3	
	f) Define dip and magnetic declination.	R	3	
	Attempt any FOUR :			16
	a) Explain the principles of surveying with neat sketches.	U	1	
	b) State the instruments used in linear measurements with their function.	U	1	
	c) The length of survey line was measured with a 20 m chain and was found to be equals to 1490 m. If the chain was 5 cm too short, calculate true length of line.	A	1	
	d) Define survey station, check line, long offset and short offset.	R	2	
	e) Describe the process of chaining when a river crosses a chain line.	U	2	
	f) Explain procedure of marking offset using open cross staff.	A	2	
Q.3	Attempt any FOUR :			16
	a) Plot the given cross staff survey of a field and calculate area of the field ABCDA	A	2	
	b) Differentiate between WCB & RB (any four points)	R	3	
	c) Convert the following FB into BB i) $36^{\circ}30'$, ii) 220° , iii) $N 45^{\circ} E$, iv) $S 79^{\circ} 30' W$	A	3	
	d) Define closing error and explain how it is adjusted graphically	U	3	
	e) Explain the field procedure of compass traverse.	U	3	
	f) Following are the bearings of the sides of a closed traverse. At what stations is local attractions suspected? Compute the correct bearings of the side of the traverse.	A	3	

Line	FB	BB
AB	$325^{\circ}30'$	$145^{\circ}30'$
BC	67°	243°
CD	$194^{\circ}15'$	$20^{\circ}15'$
DA	219°	37°

Q3a

Q3a				11	
					
A				2	
04					

QN	S	R/	Co	Mar
Q	N	U/	CTG	ks
N		A	308	
Q.4	Attempt any FOUR :			08
	a) Define i) Datum ii) Fore sight.	U	4	
	b) State any four types of levels.	R	4	
	c) Define i) Change point ii) Line of collimation	U	4	
	d) What is a contour?	R	5	
	e) Define i) Contour interval ii) Horizontal equivalent	U	5	
	f) What is meant by Zero Circle?	U	6	
Q.5	Attempt any TWO :			16
	a) The following consecutive readings were taken with a level and 4m staff on continually sloping ground at a common interval of 30m. 0.780, 1.535, 1.955, 2.430, 2.985, 3.480, 1.155, 1.960, 2.365, 3.640, 0.935, 1.045, 1.630 & 2.545. The RL of the first point was 180.750 m. Role out a page of level field book & enter the above readings. Calculate the reduced levels of the points by rise & fall rise & fall method and also the gradient of a line joining the first and last point.	A	4	
	b) i) What are the sources of errors in leveling & explain any one. ii) Describe in detail temporary adjustment of dumpy level	U U	4 4	
	c) i) Describe any four important characteristics of contour lines with neat sketch. ii) The following readings were take when the Perimeter of a figure was traversed clockwise with anchor point outside and with the tracing arm set to natural scale (m=100 sq.cm). The zero mark of the disc passed the fixed index mark once in the clockwise (positive) direction. Initial Reading = 9.625, F.R=1.224. Calculate the area of the figure.	A	5 6	
Q.6	Attempt any TWO :			16
	a) The consecutive readings were taken with a dumpy level. 3.875, 3.630, 2.865, 1.945, 0.920, 3.165, 2.860, 1.895, 2.125, 0.965 & 0.785. The level was shifted after fifth & eighth readings. The first reading was taken on Bench mark of RL 260.865. Use collimation plane method to calculate reduced levels of all points. Apply usual checks.	A	4	
	b) i) Find the height of chhajja above the floor from the following RL of floor level = 50.000m Staff reading on the floor = 1.525m Reading on the staff held inverted, the bottom touching the underside of chhajja = 3.515. ii) What is a bench mark? State the different types of bench mark and explain any one.	A	4	
	c) i) State the various methods of locating contours & explain any one in detail. ii) Draw a neat labelled sketch of a digital planimeter and state its use.	U U	5 6	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **FIFTH PROGRAM : CIVIL ENGINEERING**

COURSE CODE :- **CEF507**

COURSE NAME **IRRIGATION ENGINEERING**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **23/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	Section- I	R/ U/ A	Co CEF 507	Marks
Q.1		Attempt any FOUR :			08
	a)	State the illeffects of over irrigation.	R	1	
	b)	What do you mean by runoff? List of the methods of determining the runoff.	U	2	
	c)	Define the terms- Crop period and Base period.	R	3	
	d)	State the meaning of terms - command area and culturable command area.	R	3	
	e)	What is Bandhara irrigation scheme?	R	4	
	f)	State the types of irrigation projects for the purpose of administration.	U	1	
Q.2		Attempt any FOUR :			16
	a)	State the advantages of irrigation project?	R/U	1	
	b)	List the methods of calculating average annual rainfall & Explain in brief more accurate method.	A	1	
	c)	Explain in brief the recuperation method of determining yield of a well.	A	4	
	d)	Draw the neat layout plan of Bandhara irrigation scheme.	U	4	
	e)	Write a short note on shape of catchment .	R	2	
	f)	State the requirements of a site suitable for percolation tank.	U/A	4	
Q.3		Attempt any TWO :			16
	a)	Describe in brief the component of the lift irrigation scheme having river as a source with respect to their functions and broad design principles.	U/A	4	
	b)	i) State the various methods of improving duty. ii) An area irrigated by a distributary is @ 250Ha. Out of which 160Ha is Jowar (Kharif) and 90Ha sugarcane. If delta for Jowar is 50 cm and that for sugarcane is 190cm, average transit losses during Kharif are 20% and annual transit losses are 40%, calculate the duty of each crop at the head of distributary.	U/A A	4 3	

	c)	i) Write a short note on drip irrigation. ii) Draw the plan of K.T. weir and explain in brief it's construction features.	U	3														
			U/A	4														
QN	S Q N	Section- II	R/U/ A	Co CEF 507														
Q.4		Solve any FOUR :		Ma rks 08														
	a)	Write the meaning of salt efflorescence?	R	7														
	b)	Define super passage?	U	7														
	c)	Write the function of outlet.	U	6														
	d)	What is gallery?	U	6														
	e)	Define free bound in case of Dam?	R	5														
	f)	What if flood absorption capacity?	R	5														
Q.5		Solve any FOUR :		16														
	a)	State the use of area capacity curve? Sketch it.	U	5														
	b)	Fix the FRL & HFL from the following data. D.S.L – 110.00m, effective live storage – 8000m ³ , Tank losses – 1500m ³ , MFD – 400m ³ /s, length of waste inner – 100m, use Francis formula, Free band- 1.5m	A	5														
		<table><tr><td>Contour RL</td><td>110</td><td>112</td><td>114</td><td>116</td><td>118</td><td>120</td></tr><tr><td>Capacity In m³</td><td>1000</td><td>3000</td><td>5000</td><td>6000</td><td>9000</td><td>12000</td></tr></table>	Contour RL	110	112	114	116	118	120	Capacity In m ³	1000	3000	5000	6000	9000	12000		
Contour RL	110	112	114	116	118	120												
Capacity In m ³	1000	3000	5000	6000	9000	12000												
	c)	Differentiate any four points between theoretical & practical profile in case of gravity dam.	A	6														
	d)	Sketch the earthen dam & name it.	U	6														
	e)	Draw a neat labelled sketch showing different component parts of the gravity dam. Also write their specific function.	A	6														
	f)	Write the different types of galleries provided in dam? Also write purpose of each one.	U	6														
Q.6		Solve any FOUR :		16														
	a)	Write different materials used for canal lining.	A	7														
	b)	Write any four causes & any four effects of water logging.	A	7														
	c)	Write short note on spillway gate.	U	7														
	d)	Write short note on Canal outlets.	A	7														
	e)	Discuss any four purpose of canal lining.	U	7														
	f)	Enlist any four types of cross drainage work in case of canals with their suitability.	A	7														

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

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LEVEL :- **FOURTH** PROGRAM : **CIVIL ENGINEERING**
 COURSE CODE :- **CEF401**
 COURSE NAME : **ANALYSIS OF STRUCTURE**
 MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **22/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No. SQN-Sub Question No. R- Remembering. U- Understanding. A- Application.

QN	S Q N	Section- I	R/ U/ A	Co EFF 401	Mar ks
Q.1		Attempt any FOUR :			08
	a)	A body is subjected to a direct tensile stress σ in one plane only, then determine the normal stress on an oblique section of body inclined at an angle θ .	U	1	
	b)	Draw the nature of total stress variation diagram i) If direct stress is less than bending stress. ii) If direct stress is greater than bending stress.	U	1	
	c)	State the middle third rule.	R	2	
	d)	Define eccentric load with any one example of eccentric loading.	R	2	
	e)	Define short column & long column.	R	2	
	f)	State any two assumptions made in Euler's theory of long column.	R	3	
Q.2		Attempt any FOUR :			16
	a)	A point in a strained material is subjected to two mutually perpendicular tensile stresses of 200Mpa & 100Mpa. Determine the intensities of normal, shear, resultant stresses on a plane inclined at 30° with the axis of minor tensile stress.	A	1	
	b)	An element in a strained body is subjected to a tensile stress of 150Mpa & a shear stress of 50Mpa tending to rotate the element in an anticlockwise direction. Determine following: i) The magnitude of normal & shear stress on a section inclined at 40° with tensile stress ii) The magnitude & direction of maximum shear stress that can exist on the element.	A	1	
	c)	A hollow rectangular pier is 1.2mX0.8m wide outside & 150mm thick. A vertical load of 2MN is transmitted in the plane bisecting 1.2m side & at an eccentricity of 100mm from the axis of the section. Calculate the maximum & minimum stress intensities in the section.	U	2	

d)	In a tension member 20mm in diameter the line of pull is parallel to the axis of pull is parallel to the axis of the specimen but is displaced from axis determine the distance of the line of pull from the axis, when the maximum stress is 15% greater than the stress on a section normal to axis.	U	2	
e)	Calculate the Euler's crippling load for a hollow cylindrical steel column of 38mm external diameter & 2.5mm thick. The length of the column is 2.3m & hinged at its both ends take $E=205\text{GPa}$	A	3	
f)	A 4 meter long cast iron column with both ends fixed supports. The inside diameter of the column is 60mm and external diameter 100mm Determine the safe load on column. Assume factor of safety 5, crushing stress 560Mpa & Rankines constant $1/1600$	A	3	
Q.3	Attempt any TWO :			16
a)	A point is subjected to a tensile stress of 250Mpa in the horizontal direction another tensile stress of 100Mpa in the vertical direction & shear stress 25Mpa such that when it is associated with major tensile stress & it tends to rotate the element in clockwise direction. Then determine the magnitude of the normal & shear stress on the plane inclined on a section at an angle 20° with the major tensile stress using Mohr's circle method.	U	1	
b)	i) A hollow square masonry pier is outside 2mX2m wide & 0.4m thick. Height of the pier is 20m. The horizontal intensity of wind pressure is 1.5 kN/m^2 . & unit weight of masonry is 22 kN/m^3 . Determine maximum & minimum stress intensities at the base of the pier. ii) for above problem Q.3b i) Determine cross section of the circular solid pier of the same maximum stress intensity.	A	2	
c)	Compare the ratio of the strength of a solid steel column to that of a hollow of the same cross sectional area using Euler's formula if the internal diameter of the hollow column is $\frac{3}{4}$ of the external diameter. Both column have the same length & are pinned at both ends.	U	1	

P.T.O.

		Section- II			
QN	S Q N		R/ U/ A	Co CEF 401	Mar ks
Q.4		Attempt any FOUR :			08
	a)	State meaning & effect of fixity of support.	U	4	
	b)	Define continuous beams with any one field example.	R	4	
	c)	State the advantages of fixed beam.	R	4	
	d)	Define slop of beam & show in figure with s/s beam.	R	4	
	e)	Define radius of curvature with it's application.	R	6	
	f)	Calculate maximum deflection, in terms of EI. of cantilever beam of span 3m carrying 10kN at its free end.	A	6	
Q.5		Attempt any TWO :			16
	a)	A fixed beam of span 6m carries 3 point loads of 10kN at equidistance along with 5kN/m UDL on entire span. Draw SFD & BMD with calculations at important point.	A	4	
	b)	A continuous beam ABCD is fixed at A & simply supported at C and D. It carries UDL of 10kN/m over entire span with point load of 25kN at point. B, span AB=2m & span BC=CD=1.5m. Draw BMD using Clapeyron's Theorem.	A	4	
	c)	Solve Q. 5 (b) using moment distribution method.	A	5	
Q.6		Attempt any TWO :			16
	a)	A beam ABCD is s/s at A,B,C & D carries point load of 35kN at center of AB and BC carries UDL of 15kN/m and CD carries point load of 10kN at 1m from point D. if span AB=BC=3m & CD=4m, Draw BMD of entire beam using Clapeyron's theorem.	A	5	
	b)	Solve Q.6 (a) using moment distribution method.	A	5	
	c)	A simply supported beam ABCD is simple supports at A & D with span AB=2m & BC=CD=3m. The beam carries UDL on entire of 5kN/m with point load of 12kN and 15kN at B & C using Macaulay's method determine maximum deflection in term of EI.	A	6	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **THIRD PROGRAM : CIVIL ENGINEERING**

COURSE CODE :- **CEG306/CEF306**

COURSE NAME **HYDRAULICS**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **22/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/	Co	Mar
	Q	U/	CEG	ks
	N	A	306	
Q.1	Attempt any FOUR :			08
a)	Define ideal fluid & real fluid.	R	1	02
b)	Define i) Surface tension. ii) Viscosity.	R	1	02
c)	State 'Pascal's law' of liquid pressure.	U	2	02
d)	Find the intensity of pressure in water at a depth 6.0m below free surface	A	2	02
e)	Define pressure flow? Give an example.	R	3	02
f)	Define flownet. State it's uses	U	3	02
Q.2	Attempt any FOUR :			16
a)	State any four importance of Hydraulics in Irrigation engineering & in Environmental engineering each.	U	1	04
b)	A differential manometer containing mercury was used to measure the difference of pressure in pipes containing water as shown in fig. Find the difference of pressure in the pipes, if the manometer reading is 0.8m.	A	1	04
c)	i) Determine the intensity of pressure at a depth of 1.50 km below the sea water surface having specific gravity 1.10. ii) A tank 3mX4m 1.2m deep contains oil of specific gravity 0.8. Find – 1) Intensity of pressure at the base of tank 2) Total pressure on the base of tank.	U	2	02
d)	A circular plate 4.0m diameter is increased in water such that its greatest and least depth below the free surface of water are 5m and 3m respectively. Calculate- i) The total pressure on one face of the plate. ii) The position of center of pressure.	A	1	04
e)	Discuss the terms pressure head, velocity head, datum head & total lead. Write expression for each.	U	3	04
f)	The diameter of pipe changes from 24cm at section 5m above datum & 8cm at a section 2m above datum. The pressure of water at 1 st section is 40N/cm ² . If the velocity of flow at first section is 2m/sec, determine the intensity of pressure in N/cm ² at the second section.	A	3	04

Q.3	Attempt any FOUR :			16
a)	Convert the followings- i) A pressure head of 65cm of mercury into the pressure head of oil of sp. gravity 0.8 ii) Gauge pressure of 12.5m of oil of sp. gravity 0.8 into the pressure in KN/m^2 . Take atmospheric pressure as 74cm of mercury.	U	1	02
b)	Find intensity of pressure in N/m^2 at the base of container when oil of specific gravity (0.85) stands for 0.625m of water of 1m height. Draw the pressure diagram for given case.	A	2	04
c)	Define absolute pressure, gauge pressure & vacuum pressure and show the relationship.	U	2	04
d)	i) Define pressure diagram. State any four uses of pressure diagram. ii) Explain variation of pressure in horizontal & vertical direction in static liquid.	U	2	02
e)	The slope of the center line of 1000m long tapering pipe is 1 in 100. The diameters of the upper end are 4m & 2m respectively. The quantity of water flowing is $9\text{m}^3/\text{min}$. If the pressure intensity of the upper end is 100 N/cm^2 . Find the intensity of pressure at the lower end, neglecting friction.	A	3	04
f)	A pipeline 60cm diameter bifurcate at a Y junction into two branches 40cm & 30 cm in diameter. If the rate of flow in the main pipe is $1.5\text{ m}^3/\text{sec}$ and mean velocity of flow in 30cm diameter pipe is 7.5 m/sec, determine the rate of flow in the 40cm diameter pipe.	A	3	04
Q.4	Attempt any FOUR :			08
a)	State the Dupuit's equation	R	4	02
b)	Write the phenomenon of flow through a syphon pipe.	R	4	02
c)	Define the terms i) Hydraulic Gradient Line ii) Total energy line	R	4	02
d)	Define most economical section	R	5	02
e)	State Manning's formula & write meaning rotations.	R	5	02
f)	State the manning of term priming.	R	6	02
Q.5	Attempt any FOUR :			16
a)	Two tanks are connected by two parallel pipes of diameter 100mm & 200mm respectively having length of 700m. Find the discharge through each pipe if difference in water levels of two tanks is 8.20m. Take $f = 0.027$. for both pipes.	A	4	04
b)	Explain in brief the phenomenon of water hammer in pipes. State two precautions to avoid it.	U	5	04
c)	Three pipes having same length and same friction factor have different diameters as 140mm, 100mm & 90mm when these three pipes are connected in parallel gives the total discharge of $0.51\text{ m}^3/\text{sec}$. Find the discharge in each pipe.	U	5	04
d)	A rectangular channel having hydraulic mean depth of 2m, discharge water with velocity 1m/sec. Find the value of chezy's constant if the bed slope is in 8000.	A	6	04
e)	Define hydraulic jump, explain clearly how it is formed.	A	6	04

	f)	An earthen channel with a base 3m wide & side slopes 1:1 carries water with a depth of 1m. The bed slope is 1 in 1600. Estimate the discharge. Take value of N in Manning's formula as 0.04.	A	5	04
Q.6		Attempt any FOUR :			16
	a)	A pipe 20cm diameter is 20m long & velocity in the pipe is 8m/sec. What loss of head would be saved if the last 5m length of pipe is replaced by 30 cm dia. pipe. The change in section being sudden? Assume $f=0.04$ for both the pipes.	A	4	04
	b)	Explain with sketch the principle underlying the construction of a venturimeter.	U	4	04
	c)	State Manning's formula. Explain terms in it.	A	5	04
	d)	Define w.r.t. open channel flow 1) Wetted area 2) Wetted perimeter	U	5	04
	e)	Explain working of centrifugal pumps with suitable diagram.	U	6	04
	f)	Calculate the power of the pump from the following data. i) Total static lift = 30m. ii) Dia. of suction pipe = 15cm. iii) Dia. Of delivery pipe = 10cm. iv) Length of suction pipe = 6cm v) Length of delivery pipe = 60m. vi) $f = 0.04$ for both pipes. vii) Efficiency = 80% viii) $Q = 40 \text{ lit/sec}$.	A	6	04

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

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LEVEL :- FOURTH PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEF 402

COURSE NAME DESIGN & DRAFTING OF RCC STRUCTURE

MAX. MARKS : 80 TIME : 5.00 HRS. DATE :- 30/06 / 2022

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S Q N	Section- I		R/ U/ A	Co CEG 402	Mar ks
		Attempt any FOUR :				
Q.1						08
	a)	Define limit state. Write the value of partial safety factor for concrete & steel in limit state method.	R		1	02
	b)	State four functions of reinforcement in R.C.C. section.	R		1	02
	c)	State any four situations where doubly reinforced beam section are preferred.	R		2	02
	d)	Differentiate between over reinforced & under reinforced beam section. (Any Four points)	R		2	02
	e)	State expression for L flanged beam with meaning of each term.	R		3	02
	f)	State equation for moment of resistance in the case of neutral axis lies in the Web of T beam & $0.43xu \geq Df$. with meaning of each term in it.	R		3	02
Q.2		Attempt any TWO :				16
	a)	i) Draw a neat diagram of typical reinforcement detailing of T shaped cantilever retaining wall. ii) Draw ductile detailing for Beam as per IS 13920:2000, showing anchorage for bars in external joint.	U		1	04
	b)	A singly reinforced beam 250X465mm effective to the centre of 6 bars of 16mm diameter, determine ultimate moment of resistance of beam. If Fe415 & M20 grades are used. If span of the beam is 6 meter then calculate maximum U.D. L. that beam can carry on the entire span.	A		2	08
	c)	A doubly reinforced section for a rectangular beam having effective span of 5 meter. The superimposed load is 40KN/m & size is limited to 230mm X 450mm overall. Design the section & find AS_t and AS_c . use M20 concrete & Fe 415 steel. Cover on both side is 30mm & ($f_{sc} = 355 \text{ N/m}^2$ for $d/d=0.05$ & $f_{sc} = 352 \text{ N/m}^2$ for $d/d = 0.10$)	A		2	08

Q.3		Attempt any TWO :			16
	a)	i) Explain defects in structure due to earthquake. ii) State any two advantages & two disadvantages of prestressing.	R	1	08
	b)	A RCC rectangular beam having an effective span 5 meter. It carries U.D.L. of 12 KN/m including its self weight over its entire span. Use M20 & Fe 415 steel. Take width of beam 230mm & clear cover 25mm. Design the section. Find overall depth of beam & steel required.	A	2	08
	c)	A Tee beam for a room floor with following data. Clear span 6m, width of support 450mm spacing of tee beam rib = 2.75 m c/c Live load on slab = 4 KN/m ² Slab thickness = 100mm Material used = M20 & Fe415 Width of rib = 230mm Cover to the beam = 40mm (Assume N.A. lies in the flange.)	A	2	08
QN	S Q N	Section- II	R/ U/ A	Co CEG 402	Mar ks
Q.4		Attempt any FOUR :			08
	a)	State the function of shear reinforcement.	R	4	02
	b)	Define i) Bond ii) Development length	R	4	02
	c)	Explain the two cases of torsion with figure in RCC structures.	R	4	02
	d)	Explain the purpose of transverse reinforcement in RCC slab.	R	5	02
	e)	State the check for axially loaded RCC short column as per IS code.	R	6	02
	f)	Draw neat sketch showing RCC piles with its component.	U	6	02
Q.5		Attempt any TWO :			16
	a)	A simply supported beam of effective span 5m with 350X500mm effective size carrying UDL of 42 KN/m over entire span is reinforced with 20mm diameter bars (3 straight & 1 bent up) at support. Design the beam for shear with 8mm diameter. Use material M20 & Fe415 with shear stress of concrete is 0.5MPa.	A	4	08
	b)	i) Explain the various form of shear reinforcement used in RCC beam. ii) Calculate development length for Fe500 20mm dia bar in tension & compression. If bond stress given for plain bar is 1.2MPa.	R	4	08
	c)	Design a cantilever chhajja with span 1.2m & width 1.5m with live load 1KN/m ² supported by lintel 230X230mm. use concrete M20 & Steel 415. Sketch the c/s for RCC detailing. Take m.f.-1.30	A	5	08
Q.6		Attempt any TWO :			16
	a)	Design RCC slab panel of size 6.3X4.5m effective with simply supported on its four side carrying live load 3.5KN/m ² . Take coefficients $\alpha_x = 0.062$ and $\alpha_g = 0.060$ with MF = 1.4. Use material M20 and Fe415	A	5	08
	b)	Design short and axially loaded column with square section to resist the working load of 2000kN. The length of column is 3m with both ends are hinged. Use material of grade M25 & Fe415. Also show BCC detailing.	A	6	08
	c)	Design isolated square footing to support column of 400X400mm with axial load of 1200kN. Take SBC of soil 250kN/m ² . Use M20 grade of concrete & Fe415 grade of steel.	A	6	08

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- **THIRD**

PROGRAM : **CIVIL ENGINEERING**

COURSE CODE :- **CEG310/CEF310**

COURSE NAME **TRANSPORTATION ENGINEERING**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **29/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	Question Text	R/ U/ A	Co CEG 310	Mar ks
Q.1		Attempt any FOUR :			08
	a)	State any four requirements of Alignment ^{el} and road.	U	1	
	b)	Define super-elevation. Write its minimum and maximum values.	R	1	
	c)	Define i) Flexible pavement ii) Prime coat.	R	2	
	d)	State the necessity of joints in concrete roads.	U	2	
	e)	Write the suitability of following shapes of tunnels i) Egg type shape tunnel. ii) Segmental shape tunnel.	A	3	
	f)	Enlist the operations involved in survey work of tunnels.	U	3	
Q.2		el 1 d) differentiate any four points between rigid & flexible pavement. Attempt any FOUR :			16
	a)	Draw the cross section of National Highway in embankment, showing clearly the land width, formation width, pavement width, locations of side drains, tree etc. with dimensions.	A	1	
	b)	i) What do you understand by traffic volume study? ii) State any six purpose of traffic volume study.	U U	1 1	
	c)	Explain the construction procedure of WBM roads with the materials used for construction.	A	2	
	d)	Why joints are necessary in cement concrete pavement? Name various types of joints and sketch one of each type.	U	2	
	e)	Define shaft in tunnel. State the step by step construction procedure of shaft in tunnels.	U	3	
	f)	Briefly describe the construction procedure of tunnel through hard rock by full face heading method with a neat labelled sketch.	A	3	
Q.3		Attempt any FOUR :			16
	a)	i) Explain the significance of road gradients in road alignment. ii) Define the following terms and write its IRC values of gradient. 1) Exceptional gradient. 2) Ruling gradient.	A R	1 1	
	b)	i) Define camber in Road Surface Illustrate it with a ^{net} sketch. ii) Explain the necessity of camber and point out the effects of excessive camber.	R A	1 1	
	c)	Discuss in brief the construction procedure of bituminous carpet road with its required materials for construction.	A	2	
	d)	State any four advantages and any four disadvantages of concrete road.	R	2	
	e)	i) State any four factors affecting the type of lining. ii) State any four purposes of providing the lining.	U A	3 3	
	f)	Discuss the following terms in short (any two) i) Initial survey. ii) Mucking iii) Maintenance of tunnel.	A	3	

Q.4	Attempt any FOUR :			08
	a) Define 'Permanent Way'.		R	4
	b) Define i) Stock Rail ii) Tongue Rail		R	4
	c) State any two necessities of points and crossing in railway track.		U	5
	d) Define the term 'yard'.		R	5
	e) State any two functions of foundations of bridge.		R	6
	f) Differentiate between causeway and culvert.		U	6
Q.5	Attempt any FOUR :			16
	a) State the meaning of creep of rail. State any eight causes of creep of rail.	U	4	
	b) Define coning of wheels. Explain its necessity with neat labelled sketch.	U	4	
	c) State the types of gauges with their gauge length.	U	4	
	d) Draw the neat sketch of marshalling yard.	U	5	
	e) Draw a neat labelled sketch of left hand turnout and explain in short.	A	5	
	f) Classify the bridge according to span length purpose, alignment & according to level of bridge floor.	U	6	
Q.6	Attempt any FOUR :			16
	a) State any four functions of ballast.	U	4	
	b) Illustrate the neat sketch of layout of way side station showing the double line track and write its necessity.	A	5	
	c) State any two functions of bridge bearing. Draw a neat sketch of fixed bearing of RCC slab bridge.	A	6	
	d) Define the term points and crossings in permanent way and state its necessity.	U	6	
	e) Draw a plan and section showing component parts of bridge.	A	6	
	f) Explain any four functions of abutments.	R	6	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

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LEVEL :- **THIRD PROGRAM : CIVIL ENGINEERING**

COURSE CODE :- **CEG 307 / CEE307 / CEF307**

COURSE NAME **MECHANICS OF STRUCTURES**

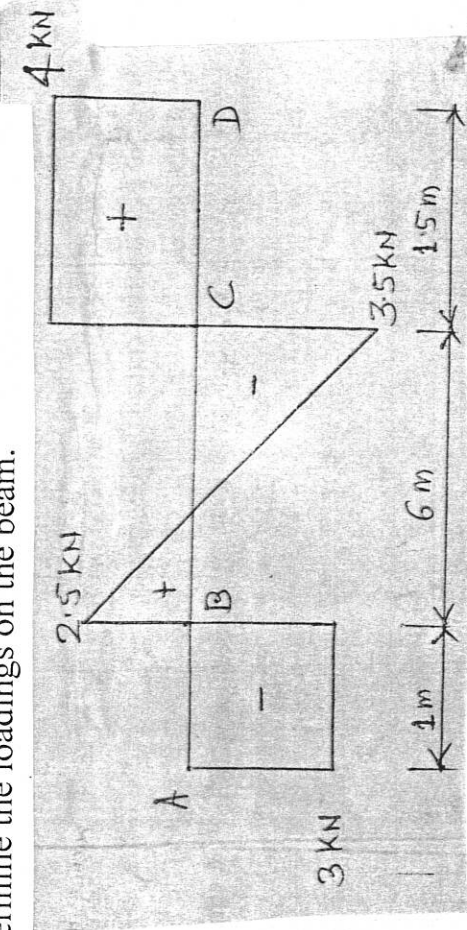
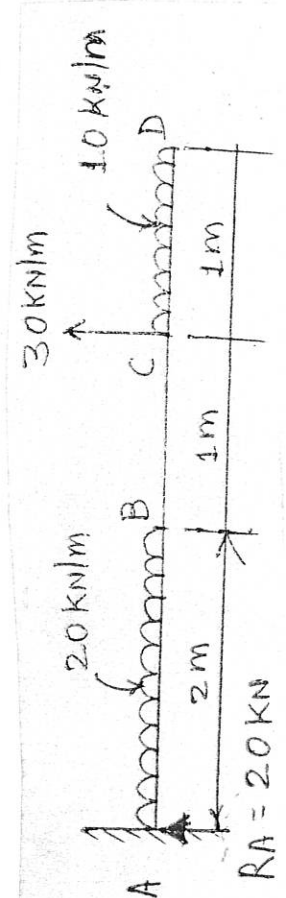
MAX. MARKS : **80** TIME : **3 HRS 45 MIN.** DATE :- **01/ 07 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/	Co	Mar
	Q	U/	CEG	ks
	N	A	307	
Q.1	Attempt any FOUR :			08
	a) Define structure.	R	2	02
	b) Define a 'point of Contraflexure' or 'point of inflection'.	R	3	02
	c) Define Hook's law with expression.	R	2	02
	d) Enlist any two structural systems with field example.	R	1	02
	e) Define torsion.	R	1	02
	f) State the expression for volumetric strain of a rectangular body subjected to a uniaxial load.	R	2	02
Q.2	Attempt any FOUR :			16
	a) Figure a shows bi-axial stress system. Find the change in AB and BC. Take $E = 200 \text{ KN/mm}^2$ and $\mu = 0.25$	U	1	04
	<u>Figure a.</u>			
	b) A steel rod 4.5m long is at a temperature of 28°C . Find the free expansion of the rod when the temperature is raised to 78°C . If the expansion is completely prevented, find the magnitude and nature of temperature stress and strain developed.	A	2	04
	c) i) Define a static determinacy of a structure. ii) Enlist types of structural connections in structure.	R	1	04
	d) A beam of span 6m carries a U.D.L. of 1.5 kN per meter run over the entire span and two point loads of 4kN and 5kN at 2m and 4m from left hand support. Find the position and magnitude of maximum bending moment & Draw S.F.D. and B.M. diagrams.	U	3	04

P.T.O.

e)	Explain the types of structural materials and their suitability.	U	1	04
f)	Draw SFD for the cantilever beam loaded as described below. Span = 4.0m = PT End P is fixed and $PQ = QR = RS = ST = 1\text{m}$ over portion PR, a U.D.L. of 20kN/m acts and point loads of 20kN , 30kN and 10kN act at Q, S and T respectively.	A	3	04
Q.3	Attempt any FOUR :			16
a)	Differentiate between lateral and linear strain.	U	2	04
b)	A shear force diagram for the loaded beam is as shown in figure b. Determine the loadings on the beam.	A	2	04
				
c)	In a tri-axial stress system, the stresses along the three directions are $\sigma_x = 100\text{N/mm}^2$ (tensile), $\sigma_y = 60\text{N/mm}^2$ (tensile), and $\sigma_z = 30\text{N/mm}^2$ (compressive). Find the strains in each direction. Take $E=2 \times 10^5\text{ N/mm}^2$ and $\mu = 0.25$. If $x = 400\text{mm}$, $y = 150\text{mm}$ and $Z = 300\text{mm}$. Calculate the change in volume.	U	2	04
d)	Draw the B. M. D. diagrams for the beam shown in figure C.	A	3	04
				
e)	State any two relations between bulk modulus, modulus of rigidity and modulus of elasticity of a material. State the meaning of each term used in it.	R	2	04
f)	Define structural analysis & structural design.	R	1	04
Q.4	Attempt any FOUR :			08
a)	Define 'Radius of gyration'.	R	4	02
b)	Define polar moment of inertia.	R	4	02
c)	State Flexural formula and write meaning of each term.	R	5	02
d)	Define bending stress.	R	5	02
e)	Draw bending stress diagram for channel section.	U	5	02
f)	Define Resilience.	R	6	02

Q.5	Attempt any FOUR :				16
	a) A 'T' section has flange (60mm X 10mm) and Web (10mm X 70mm). Calculate moment of inertia about xx, yy axis. Also calculate polar MI.	A	4		04
	b) Determine moment of inertia and radius of gyration of quarter circle of radius 600mm at its own axis.	A	4		04
	c) State any four assumptions made in theory of pure bending.	R	5		04
	d) Draw shear stress distribution diagram for following sections. i) Symmetrical I section. ii) T section.	U	5		04
	e) A timber beam 150mm wide and 30mm deep is simply supported over a span of 4m. it carries a UDL 10kN/m. Determine maximum bending stress induced in the section.	A	5		04
	f) A copper rod of 20mm diameter is 500mm long. It is subjected to axial pull of 2.4kN applied suddenly. Calculate i) Stress induced in rod. ii) Elongation. iii) Energy stored in the rod. Take $E = 110\text{GPa}$	A	5		04
Q.6	Attempt any FOUR :				
	a) Determine moment of inertia of a solid circular lamina about its tangent.	A	4		04
	b) An symmetrical I section 300mm deep is simply supported at ends and carries 100kN at centre. If $I_{xx} = 73.33 \times 10^6 \text{mm}^4$. Calculate maximum span if the permissible bending stress is 120N/mm^2 .	A	5		04
	c) A beam 120mm wide & 200mm deep is subjected to shear force 48kN, at particular section. Calculate maximum shear stress and sketch shear stress distribution diagram across the section.	A	5		04
	d) A beam section 100mm X 200mm is subjected to shear force 60kN. Determine shear stress induced on a layer 50mm above NA and 25mm below NA.	A	5		04
	e) A weight of 2kN dropped on to a collar at the lowest end of a vertical bar 3m long and 28mm in diameter. Calculate the height of drop. If maximum instantaneous stress is not to exceed 120N/mm^2 . $E = 2 \times 10^5 \text{N/mm}^2$	A	6		04
	f) i) State parallel axis theorem along with expression & neat sketch. ii) Differentiate between suddenly applied load & gradually applied load.	U	6		04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **FIFTH** PROGRAM : **CIVIL ENGINEERING**
COURSE CODE :- **CEF 510/CE408**
COURSE NAME **SOLID WASTE MANAGEMENT**
MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **27/ 06 / 2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S Q N	Section- I	R/U/ A	Co CEF 510	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define toxic waste.	R	1	02
	b)	Write the meaning of transfer station.	R	2	02
	c)	State any four uses of solid waste as raw material in Industry.	U	2	02
	d)	State any two precautions while handling hazardous waste.	A	3	02
	e)	Enlist transportation vehicles for solid waste management.	A	2	02
	f)	What do you mean by non clinical waste.	U	4	02
Q.2		Attempt any FOUR :			16
	a)	Explain the chemical characteristics of solid waste.	U	1	4
	b)	Discuss the term composting of solid waste with a neat sketch.	A	1	04
	c)	Enlist any two transportation equipments & ant two transportation vehicles with their suitability.	A	2	04
	d)	Write the names of agencies who works in the organization pattern. Explain the role of each.	A	2	4
	e)	What care should be taken to preserve the health of workers who involved in handling and processing of solid waste.	A	3	04
	f)	Explain transportation of biochemical waste.	U	4	04
Q.3		Attempt any FOUR :			16
	a)	Discuss different sources of solid waste in India.	A	1	04
	b)	State any four methods of collection of solid waste.	U	2	
	c)	State the necessity of transfer stations and factors to be considered for locating it.	A	2	04
	d)	Explain the role of public participation in solid waste management.	A	3	04
	e)	Discuss, which type of health problems arising during segregation, reuse, recovery, recycling of hazardous waste.	A	4	04
	f)	Explain incineration method of disposal of solid waste	A	4	04

QN		S		Section- II		R/U/ A	Co MEF 406	Ma rks
Q.4				Attempt any FOUR :				08
	a)			What is sanitary land filling?		U	5	02
	b)			Which is real obstacle in composting the solid waste from urban area?		U	6	02
	c)			State any four factors governing composting.		R	6	02
	d)			What is vermi composting?		U	6	02
	e)			State any two types of incinerators.		R	7	02
	f)			State any four solid wastes from steel plants.		R	8	02
Q.5				Attempt any FOUR :				16
	a)			Write a short note on 'Pyrolysis'.		U	7	04
	b)			What is the responsibility of industry for their waste disposal.		U	8	04
	c)			Explain in brief factors affecting site selection of land filling.		U	5	04
	d)			Enlist the benefits of composting.		U	6	04
	e)			What is a leachate? How it is controlled?		U	5	04
	f)			Describe in brief 'Recovery of Bio-gas energy from Organic solid waste'.		U	6	04
Q.6				Attempt any FOUR :				16
	a)			State the advantages and disadvantages of land filling methods.		R	5	04
	b)			Draw and explain municipal incineration.		U	7	04
	c)			What are different wastes generated from steel plants & thermal power plants? State their effects on environment.		U	8	04
	d)			Write a short note on 'Recycling of industrial wastes'.		U	6	04
	e)			What are the mechanical equipments used for compaction of solid waste?		U	6	04
	f)			Write the advantages and disadvantages of incineration process.		R	7	04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO.

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LEVEL :- **FIRST**

PROGRAM : CE/MT

COURSE CODE :- **CCG108 / CCF108 / CEE108**

COURSE NAME **ENGINEERING DRAWING - II**

MAX. MARKS : **80** TIME : **05Hrs**

DATE :- **08/07/2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.

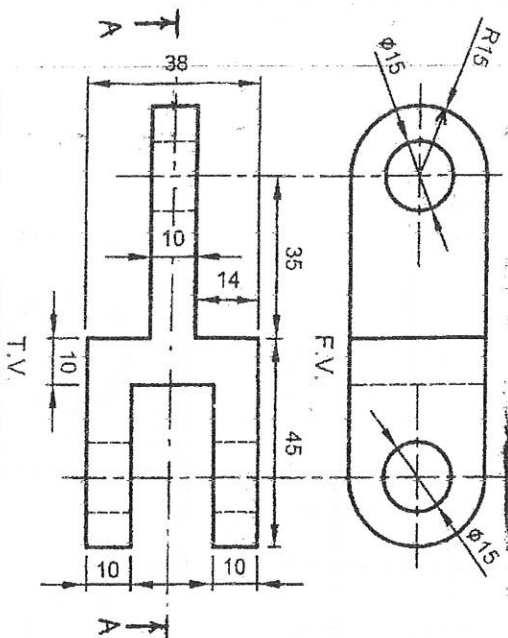
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S Q N	Question Text	R/ U/ A	Co CCG 108	Mar ks
Q.1		Draw Proportionate free hand sketches for the following (Any Four)	R & U	3	08
	a)	Sellers thread.			
	b)	Eye Foundation bolt.			
	c)	Double Riveted butt joint.			
	d)	T-Headed bolt. (2 views)			
	e)	Flanged Nut. (2 views)			
	f)	Fillet Weld.			
Q.2		Attempt any TWO	U	1	16
	a)	A pentagonal prism base 30mm side and axis 60mm long, is standing on a corner of the base on HP, with its axis inclined at 45° to H.P. and parallel to V.P. Draw – i) Initial Position. ii) Inclined Position. iii) Side View.			03 03 02
	b)	A square pyramid 40mm edge of base and 60mm axis length is resting on one of its triangular faces in the V.P. and axis is parallel to the H.P. Draw- i) Initial Position. ii) Inclined Position. iii) Side View.			03 03 02
	c)	A cylinder of base diameter 40mm and axis length 60mm is kept on the H.P. on a point of its base circle such that its axis is inclined to H.P. at 30° and parallel to V.P. Draw- i) Initial Position. ii) Inclined Position. iii) Side View.			03 03 02
Q.3		Attempt any TWO :	U	2	16
	a)	A cube of 50mm long edges is resting on H.P. on one of its faces with vertical faces equally inclined to V.P. It is cut by an auxiliary inclined plane in such a way that true shape of section is a triangle of base 60mm and altitude 40mm. Draw- i) Front view. ii) Sectional top view. iii) True shape of section.	U	2	03 03 02

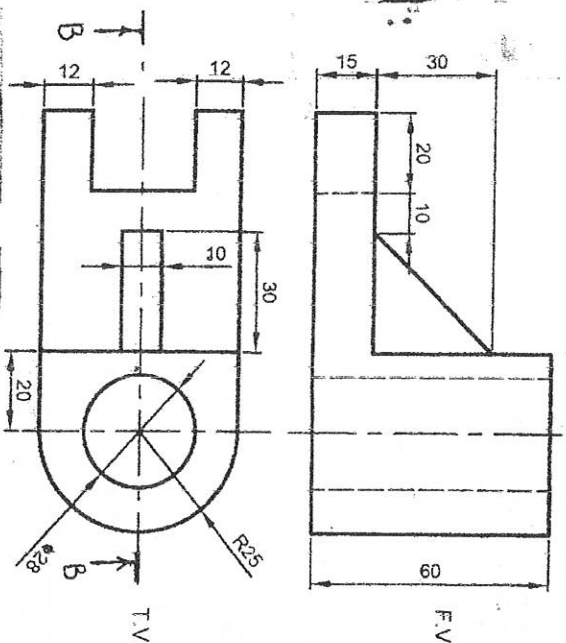
P.T.O.

b)	A pentagonal pyramid, base 30mm side and axis 75mm long is standing vertically on the ground with one edge of the base inclined at 30° to V.P. It is cut by an auxiliary vertical plane inclined to V.P. at 45° angle, perpendicular to H.P. and 10mm away from the axis. Draw – i) Sectional Front View. ii) Top view. iii) True shape of section.	U	2	03 03 02
c)	A cone, base 60mm diameter and axis 70mm long, is resting on its base on HP. It is cut by a section plane perpendicular to VP and parallel to and 16mm away from one of its end generators. Draw- i) Front view. ii) Sectional top view. iii) True shape of section.	U	2	03 03 02
Q.4	Attempt any ONE : Fig. No. 01 shows front view and top view of an object. Draw the following views by using first angle method of projection. i) Sectional Front View along A-A. ii) Top View. iii) Right Hand Side View.			08
a)	Fig. No. 01 shows front view and top view of an object. Draw the following views by using first angle method of projection. i) Sectional Front View along A-A. ii) Top View. iii) Right Hand Side View.	U/ A	4	
b)	Fig. No. 02 shows Front View and Top View of an object. Draw the following views by using first angle method of projection. i) Sectional Front View along B-B. ii) Top View. iii) Left hand side view.	U/ A	4	
Q.5	Attempt any ONE : Fig. No. 03 shows F.V. and T.V. of an object by First Angle method. Draw an Isometric View taking 'O' as origin. Fig. No. 04 shows F.V. and T.V. of an object by First Angle method. Draw an Isometric View taking 'O' as origin. Attempt any TWO : Draw the development of lateral surface of a cylinder of Base diameter 40mm and height 60mm kept on H.P. on its base and is cut by an AIP at 45° to H.P. and bisecting the axis of the cylinder. A square prism side of base 45mm and axis length 90mm has its axis vertical and Rectangular faces equally inclined to V.P. A square hole of sides 30mm is drilled through the prism completely such that the axis of the hole is perpendicular to V.P. and bisects the axis of vertical square prism. The sides of square hole are equally inclined to H.P. Draw the development of lateral surface with effect of hole.			16
a)	Fig. No. 03 shows F.V. and T.V. of an object by First Angle method. Draw an Isometric View taking 'O' as origin.	U/ A	5	
b)	Fig. No. 04 shows F.V. and T.V. of an object by First Angle method. Draw an Isometric View taking 'O' as origin.	U/ A	5	
Q.6	Attempt any TWO : Draw the development of lateral surface of a cylinder of Base diameter 40mm and height 60mm kept on H.P. on its base and is cut by an AIP at 45° to H.P. and bisecting the axis of the cylinder. A square prism side of base 45mm and axis length 90mm has its axis vertical and Rectangular faces equally inclined to V.P. A square hole of sides 30mm is drilled through the prism completely such that the axis of the hole is perpendicular to V.P. and bisects the axis of vertical square prism. The sides of square hole are equally inclined to H.P. Draw the development of lateral surface with effect of hole.			16
a)	Draw the development of lateral surface of a cylinder of Base diameter 40mm and height 60mm kept on H.P. on its base and is cut by an AIP at 45° to H.P. and bisecting the axis of the cylinder.	U/ A	6	
b)	A square prism side of base 45mm and axis length 90mm has its axis vertical and Rectangular faces equally inclined to V.P. A square hole of sides 30mm is drilled through the prism completely such that the axis of the hole is perpendicular to V.P. and bisects the axis of vertical square prism. The sides of square hole are equally inclined to H.P. Draw the development of lateral surface with effect of hole.	U/ A	6	
c)	A cone with base diameter 60mm and axis length 70mm rests on its base on H.P. A circular hole of 30mm diameter is drilled through the cone such that its axis perpendicular to V.P, parallel to H.P. and 20mm above the base of cone. Draw the development of the surface showing the effect of the hole if axis of hole is 10mm to the right of the axis of the cone.	U/ A	6	

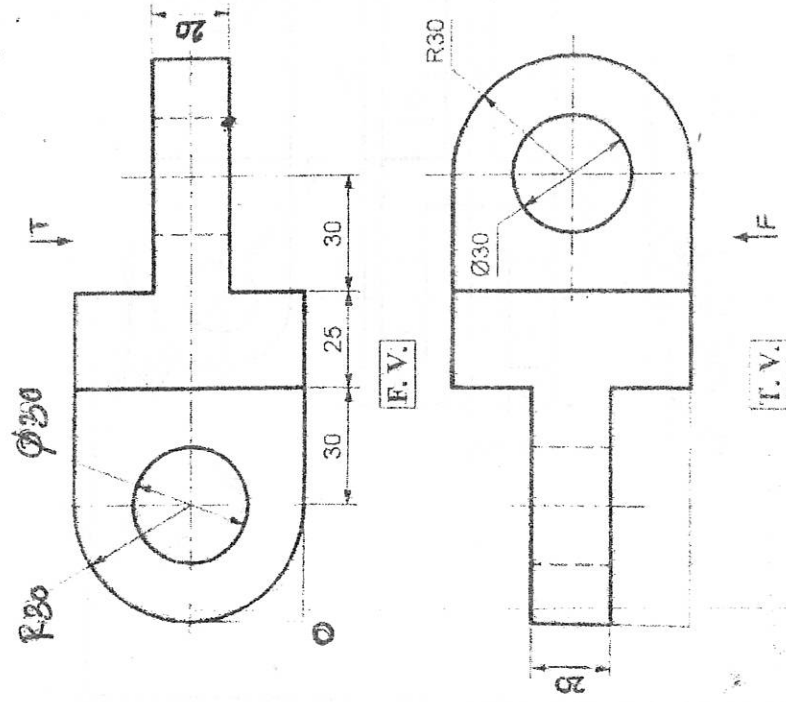
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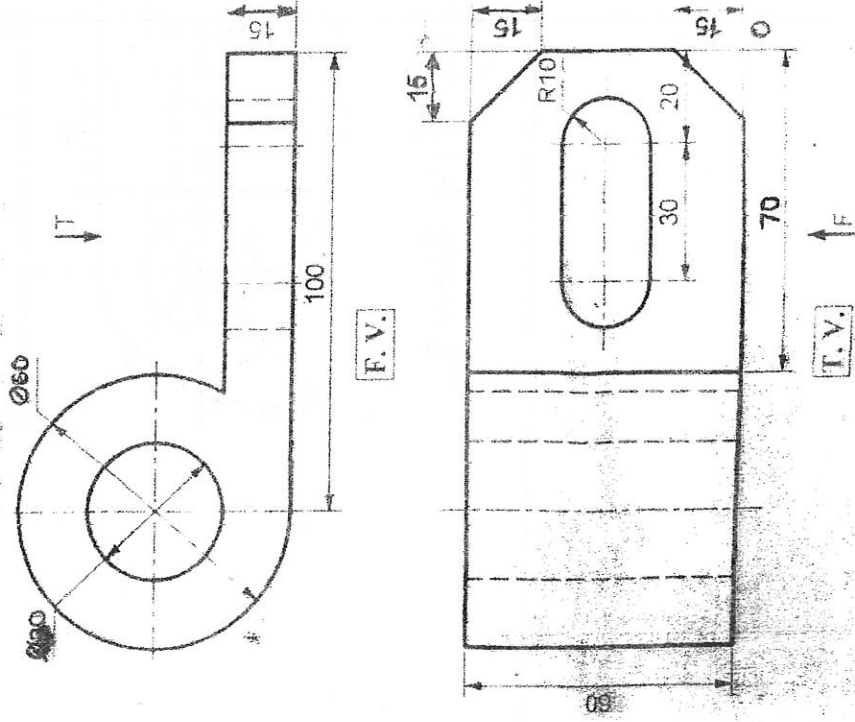
Q.4 (a) Fig No-1



Q.4 (b) Fig No-2



Q.5 (a) Fig No-3



Q.5 (b) Fig No-4

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM June-July-2022

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEG 305

COURSE NAME SOIL MECHANICS & FOUNDATION ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS 45 MIN. DATE :- 07/07/ 2022

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

QN	S N		R/U/ A	Co CEG 305	Marks
Q.1		Attempt any FOUR :			08
	a)	Define i) Liquid limit ii) Plastic limit	R	1	02
	b)	A soil sample has dry density is 1.75 g/cm^3 . What is its dry unit weight. Find bulk density if unit weight is 19.8 kN/m^3 .	R	1	02
	c)	Calculate void ratio and dry density of soil samples having porosity 35% and specific gravity 2.67.	R	1	02
	d)	Define coefficient of permeability.	R	2	02
	e)	Define equipotential line & phreatic line.	R	2	02
Q.2	f)	Enlist any four compaction methods of soil.	R	3	02
		Attempt any FOUR :			16
	a)	Explain importance of soil mechanics.	R	1	04
	b)	Explain classification of soil based on plasticity.	U	1	04
	c)	Explain various stages of consistency of soil.	U	1	04
	d)	Explain falling head method with typical values of permeability of soil.	A	2	04
	e)	Enlist compaction method in field & explain any one in detail.	A	3	04
	f)	Draw Mohr's circle for c-soil, ϕ -soil & c- ϕ soil.	A	3	04
Q.3		Attempt the FOUR :			16
	a)	Porosity of soil sample is 35% and specific gravity is 2.75 calculate void ratio, dry density, saturated density and submerged density.	A	1	04
	b)	Define water content and explain experimental determination of water content with neat sketch.	A	1	04
	c)	Explain particle size distribution curve. What is the meaning of D_{30} , D_{30} & D_{10} ?	A	1	04
	d)	Write a note on standard proctor test of soil.	U	3	04
	e)	Explain any four factors affecting compaction of soil.	U	3	04
	f)	Define flow net. Enlist any three application of flow net.	A	2	04

P.T.O.

QN	S QN		R/U/ A	Co CEG 305	Mar ks
Q.4		Attempt any FOUR :			08
	a)	Explain soil investigation by open excavation.	U	4	02
	b)	Define safe bearing capacity and ultimate bearing capacity.	R	5	02
	c)	Enlist any four structures subjected to earth pressure in field.	U	4	02
	d)	Define caisson and pier.	R	5	02
	e)	Enlist any four causes of corrosion of steel reinforcement in foundation.	R	6	02
	f)	State any four requirements of good machine foundation.	R	6	02
Q.5		Attempt any FOUR :			16
	a)	State function of Tie back with neat labelled diagram.	U	6	04
	b)	Explain any two methods of dewatering while foundation construction.	U	6	04
	c)	Explain permissible settlement of foundation.	U	5	04
	d)	State any four factors deciding depth of foundation on sloping ground.	R	5	04
	e)	Explain geophysical electrical resistivity method of soil investigation.	U	4	04
	f)	State criteria for deciding the location and number of tests pits and bore holes as per IS 1892-979	R	4	04
Q.6		Attempt any FOUR :			16
	a)	Define active pressure, passive pressure and lateral earth pressure.	R	4	04
	b)	Explain effect of water table on bearing capacity of soil when water table is well below foundation base.	U	5	04
	c)	State any four factors that decide depth of foundation.	R	5	04
	d)	Enlist any two classifications of pile foundation according to i) Method of installation. Ii) Based on material used.	R	5	04
	e)	Explain effect of sea water on foundation and protection from it.	U	6	04
	f)	Explain meaning of the term 'Vibration isolation'.	U	6	04

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

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LEVEL :- FIFTH PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEF 504

COURSE NAME CONTRACTS & ACCOUNTS

MAX. MARKS : 80 TIME : 3 HRS 45 MIN. DATE :- 07/07 / 2022

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	Section-I	R/ U/ A	Co CEF 504	Mar ks
Q.1		Attempt any FOUR :			08
	a)	Define special works and maintenance work.	R	1	02
	b)	List the names of any four methods of execution of works adopted in government organization.	R	1	02
	c)	State any four objects of contract.	R	2	02
	d)	State the purpose of security deposit.	R	3	02
	e)	Define tender notice and list any two types of tenders.	R	4	02
	f)	Define validity period.	R	4	02
Q.2		Attempt any FOUR :			16
	a)	Explain the day work method with examples and format of day work sheet.	U	1	04
	b)	Explain the classification of PWD works in detail.	U	1	04
	c)	List any eight duties and responsibilities of junior engineer.	U	1	04
	d)	List the various documents required to be submitted along with the application for registration of contractor.	R	2	04
	e)	Enlist various types of contracts (Any four) and state advantages and disadvantages (Any two) of lumpsum contract.	U	2	04
	f)	Define and explain demolition contract in detail.	R	2	04
Q.3		Attempt any FOUR :			16
	a)	Explain the clause escalation of cost.	U	3	04
	b)	Define arbitration and state the advantages of arbitration.	U	3	04
	c)	State and explain the points to be included while drafting tender notice.	U	4	04
	d)	Draft a tender notice for the construction of library building in your college assuming required information.	A	4	04
	e)	List the tender documents required and explain in detail general instructions.	U	4	04
	f)	Explain in detail two envelope method in tendering process.	U	4	04

QN	S Q N	Section- II	R/ U/ A	Co CEF 504	Mar ks
Q.4		Attempt any FOUR :	A		08
	a)	State the meaning of royalty tax.	R	5	02
	b)	What is measurement book?	R	6	02
	c)	Define mobilization advance.	R	6	02
	d)	Differentiate between price and value.	U	7	02
	e)	What is the meaning of outgoing?	R	7	02
	f)	Differentiate between depreciation and obsolescence.	U	7	02
Q.5		Attempt any FOUR :			16
	a)	State the objectives of financial management.	R	5	04
	b)	State types of budget and explain any one.	R	5	04
	c)	Write various types of taxes, Explain any one.	R	5	04
	d)	Explain the importance of maintaining accounts in P.W.D.	R	6	04
	e)	What is muster roll? State the guidelines for preparing muster roll.	R	6	04
	f)	State different types of payments made by PWD. Explain any one.	R	6	04
Q.6		Attempt any FOUR :			16
	a)	State the purpose of valuation.	R	7	04
	b)	State different types of value. Explain any one in short.	R	7	04
	c)	State the factors affecting valuation.	R	7	04
	d)	State the methods of valuation, Explain any one.	R	7	04
	e)	A property fetches a monthly rent of Rs. 8000. The outgoing are as given below. Sinking fund installment = Rs. 5000/year Annual repair charges = Rs. 3000. Other outgoing @ 20% of gross rent. Calculate capitalized value of the property if rate of interest is 7%.	A	7	04
	f)	Suggest suitable monthly rent for a property with the given data: Area of land = 600 sq.m. Built up area = 200 sq.m. Cost of land = Rs 4000/sq.m. Cost of Construction = Rs 16000/sq.m. Return expected on land cost – 5%. Return expected on building cost = 7%. Outgoing = 25% of gross rent.	A	7	04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **FOURTH** PROGRAM : **CIVIL ENGINEERING**

COURSE CODE :- **CEG 405**

COURSE NAME **CONCRETE TECHNOLOGY**

MAX. MARKS : **80** TIME : **3 HRS 45 MIN.** DATE :- **06/07/2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN		Section-I						R/	Co	Mar																								
	S							U/	CEG	ks																								
	N							A	405																									
Q.1		Attempt any FOUR :								08																								
	a)	Enlist Bogue's compounds of cement with role of each compound.						U	2	02																								
	b)	Define bulking of sand.						R	2	02																								
	c)	Draw process diagram of concrete.						U	1	02																								
	d)	Differentiate between volume batching and weight batching.						U	1	02																								
	e)	Define workability of concrete.						R	3	02																								
	f)	Define segregation and bleeding of concrete.						R	3	02																								
Q.2		Attempt any FOUR :								16																								
	a)	State super plasticizer & its uses.						U	1	04																								
	b)	State necessity of curing of concrete work. Enlist different method of curing.						U	1	04																								
	c)	Enlist any four properties of aggregates and explain any two in brief.						U	2	04																								
	d)	Explain dry manufacturing process of Portland cement.						U	2	04																								
	e)	Explain four factors affecting on workability.						U	3	04																								
	f)	Explain laboratory procedure to determine crushing value of aggregate.						U	2	04																								
Q.3		Attempt any FOUR :								16																								
	a)	Define admixture? State any four admixtures.						R	1	04																								
	b)	State two types of batching of concrete. Explain any one.						U	1	04																								
	c)	Enlist methods of transportation of concrete & explain any one.						U	1	04																								
	d)	Explain laboratory procedure to determine finess modulus of aggregate.						U	2	04																								
	e)	Calculate finess modulus and classify the sand from this weight of sample = 1000gm.						A	2	04																								
		<table><tr><td>Sieve size</td><td>4.75m</td><td>2.36m</td><td>1.18m</td><td>600μ</td><td>300 μ</td><td>150 μ</td><td>Pan</td></tr><tr><td>Wt. retained</td><td>14</td><td>128</td><td>266</td><td>308</td><td>165</td><td>84</td><td>35</td></tr><tr><td>gm</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						Sieve size	4.75m	2.36m	1.18m	600μ	300 μ	150 μ	Pan	Wt. retained	14	128	266	308	165	84	35	gm										
Sieve size	4.75m	2.36m	1.18m	600μ	300 μ	150 μ	Pan																											
Wt. retained	14	128	266	308	165	84	35																											
gm																																		
	f)	Explain with sketch slump cone test.						U	3	04																								

QN	S Q N	Section- II	R/ U/ A	Co CEG 405	Mar ks			
Q.4		Attempt any FOUR :			08			
	a)	Define formwork.	R	4	02			
	b)	Define durability of concrete.	R	5	02			
	c)	Enlist any two nondestructive test on concrete.	R	5	02			
	d)	Enlist properties of hardened concrete.	R	5	02			
	e)	Define stripping of formwork.	R	4	02			
	f)	Define 'Polymer concrete'.	R	6	02			
Q.5		Attempt any FOUR :			16			
	a)	State requirement of good formwork.	U	4	04			
	b)	Differentiate between nominal mix concrete & design mix concrete.	U	4	04			
	c)	State the importance of water cement ratio.	U	5	04			
	d)	Explain the determination of quality of concrete by ultrasonic pulse velocity test.	U	5	04			
	e)	Explain the factor causing variation in the quality of concrete.	U	5	04			
	f)	State the field application of fibre reinforced concrete.	A	6	04			
Q.6		Attempt any FOUR :			16			
	a)	State the factors which are required to be taken in to consideration while designing concrete mix.	U	4	04			
	b)	Explain the terms "impermeable concrete" and how it can be achieved.	U	5	04			
	c)	List two nondestructive methods of testing concrete . Explain any one of them.	U	5	04			
	d)	State the properties & limitations of RMC.	U	6	04			
	e)	Describe deep dump bucket method of concreting.	U	6	04			
	f)	State the precautions to be taken during hot weather concreting.	U	6	04			

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

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LEVEL :- **THIRD** PROGRAM : **CIVIL ENGINEERING**

COURSE CODE :- **CEG 302**

COURSE NAME **BUILDING CONSTRUCTION**

MAX. MARKS : **80** TIME : **3 HRS 45 MIN.** DATE :- **05/07/2022**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/	Co	Mar
	Q	U/	CEG	ks
	N	A	311	
Q.1	Attempt any FOUR :			08
a)	State any four differences between load bearing structure and framed structure.	U	1	02
b)	Define – Job layout.	R	2	02
c)	Write meaning of shallow foundation. Enlist any four types of shallow foundation.	R	2	02
d)	Define – 1) King closer 2) Sat	R	2	02
e)	Give the standard sizes of traditional and modular bricks.	U	2	02
f)	Enlist any four fixtures and fastening used for doors.	A	3	02
Q.2	Attempt any FOUR :			16
a)	State the functions of following building components. (any two of each.)	U	1	04
b)	a) Foundation b) Chejja c) Window d) Floors			
b)	State any four types of defects in a timber with a neat sketch.	R	1	04
c)	Explain with neat sketch how to transfer layout plan for framed structure on ground.	A	2	04
d)	Suggest the methods of timbering if depth of trench up to about 10m in soft ground. Explain the suggested method with a neat sketch.	A	2	04
e)	Mention the type of stone masonry which you will recommend for compound wall construction. Explain the suggested method with a neat sketch.	A	2	04
f)	Draw a neat labelled sketch of following i) Gable window ii) Dorrner window iii) Rolling shutter iv) Framed flush door	A	3	04
Q.3	Attempt any FOUR :			16
a)	State any four uses of following materials in construction industry. i) Glass ii) Bitumen iii) Plastic iv) PVC	U	1	04
b)	Discuss any eight factors that you will consider while fixing the location of doors & windows.	A	3	04
c)	Suggest the types of shallow foundation when the individual footings of columns overlap each other due to proximity. Explain the suggested type of foundation with a neat sketch.	A	2	04

d)	Sketch the following timbering & strutting method in loose soil for shallow or deep foundation & write its suitability. i) Runner system. ii) Box system..	A	2	04
e)	Write ay four comparison points between brick masonry & stone masonry.	U	2	04
f)	Draw a neat sketch of following types of scaffoldings and write its suitability- a) Double scaffolding (Draw section only) b) Needle scaffolding.	A	2	04
Q.4	Attempt any FOUR :			08
a)	Define stair & write its suitability.	R	4	02
b)	Enlist any four types of staircase & draw line sketch of each.	R	4	02
c)	Enlist any four floor finishes.	R	5	02
d)	Explain any four requirements of good roofs.	R	5	02
e)	Write any two necessities of termite proofing.	R	6	02
f)	Define 1) Grouting 2) Guniting	R	6	02
Q.5	Attempt any FOUR :			16
a)	Draw a neat sketch of section of dog legged staircase showing all the component parts.	R	4	04
b)	i) State any four factors affecting selection of flooring materials. ii) Suggest the type of flooring for following & write reason – i) for temple. ii) Dancing hall.	U/ A	5	04
c)	Write the procedure of pointing work.	U	5	04
d)	If house owner wants to apply stucco plaster for external walls for his bungalows. Suggest the step by step process for application of stucco plaster work.	A	5	04
e)	State any four necessities of formwork. Enlist any four materials used for formwork, with its suitability.	U	6	04
f)	Explain the procedure of surface preparation for white wash.	A	6	04
Q.6	Attempt any FOUR :			16
a)	Give any eight requirements of good staircase.	R	4	04
b)	Give deshurring time for following as per IS 456-2000 1. Wall, columns & vertical faces of structural members. 2. Removal of props under slab spanning up to 450m. 3. Soffit formwork to slab- 4. Soffit to beams props-	A	6	04
c)	Draw a neat labelled c/s of pitched roof showing all component parts.	U	5	04
d)	Draw a neat sketch with section and plan of column formwork.	U	6	04
e)	Give any eight requirements of good formwork.	U	6	04
f)	Explain the step by step procedure for application of internal cement mortar plaster work.	U/ A	5	04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM June-July-2022

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEF 404

COURSE NAME ESTIMATING AND COSTING

MAX. MARKS : 80 TIME : 5.00 HRS. DATE :- 04/07/ 2022

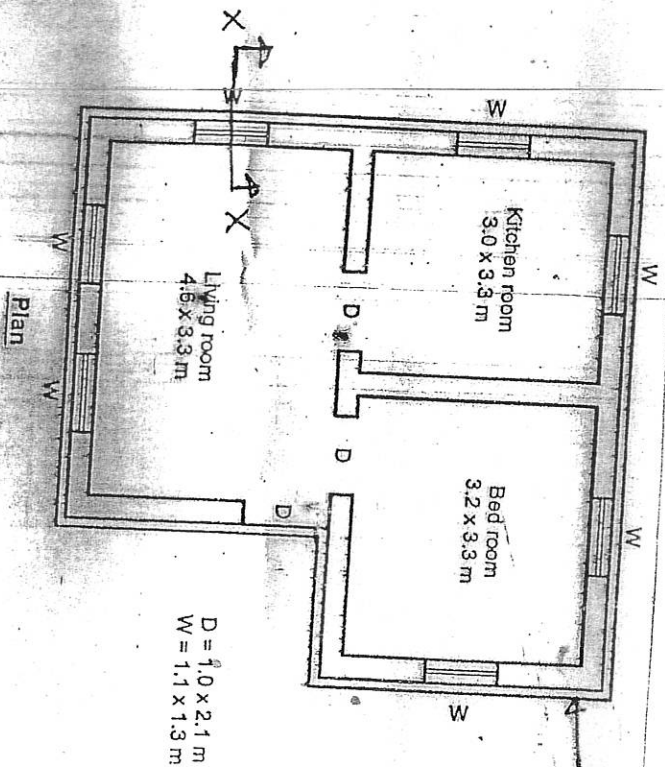
Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

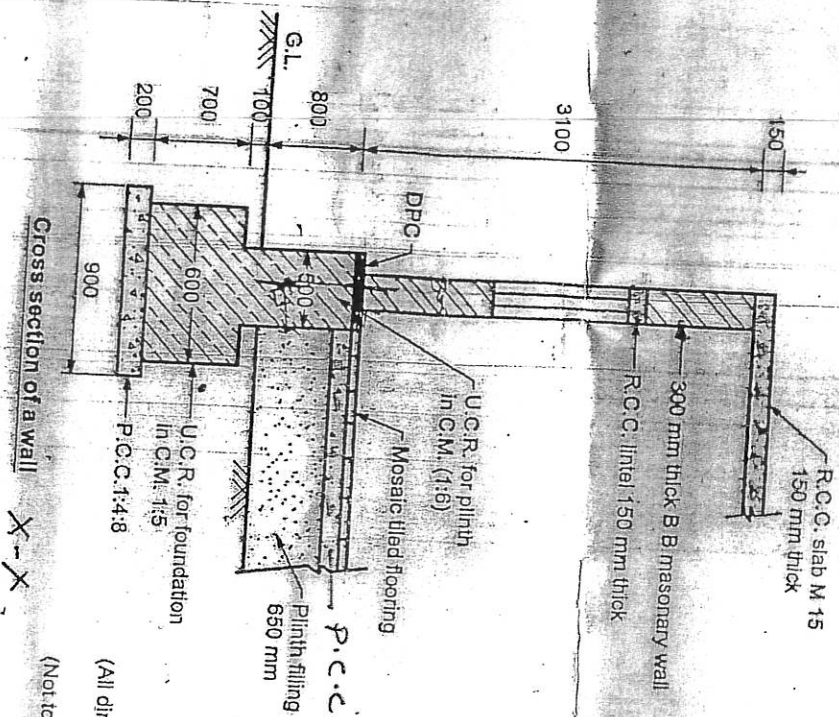
QN	S N	Section- I	R/ U/ A	Co CEF 404	Marks
Q.1		Attempt any FOUR :			08
	a)	State the meaning of ceutage charges & w. e. charges.	R	3	02
	b)	Define the term checklist & state its purpose.	R	1	02
	c)	State the meaning of estimating and costing.	R	1	02
	d)	Define approximate estimate.	R	2	02
	e)	Write the formats of measurement sheet & abstract sheet.	R	3	02
	f)	Mention the two situations under which revised estimate is prepared.	U	3	02
Q.2		Attempt any FOUR :			16
	a)	Explain the data required for preparing detailed estimation of buildings.	U	3	04
	b)	State the purposes of detailed estimate.	U	3	04
	c)	Write the mode of measurements for the following items. i) U.C.C.R. masonry in foundation. ii) R.C.C. in slab 1:2:4. iii) Excavation in hard rock. iv) Barbed wire fencing.	R	4	04
	d)	Explain bar bending schedule with standard tabular format.	U	4	04
	e)	Explain how approximate estimate is prepared for a proposed road project having 15 km length.	U	2	04
	f)	State the purpose of approximate estimate.	U	2	04
Q.3		Attempt the following :			16
		Figure no. 1 shows the plan and section of a wall. Workout the quantities of any four items and enter them in standard measurement sheet. i) Excavation for foundation. ii) B.B masonry work in superstructure. iii) U.C.C.R masonry in foundation and plinth. iv) R.C.C. 1:2:4 in slab. v) Internal plastering in all rooms in c.m. 1:4. vi) Mosaic tiles flooring in all rooms.	A	4	16

P.T.O.

QN	S	Section- II	R/ U/ A	Co CEF 404	Mar ks																					
Q.4		Attempt any FOUR :			08																					
	a)	State meanings of specification. List two types of specifications related to construction items.	R/U	5	02																					
	b)	State the data required for rate analysis.	R	6	02																					
	c)	State the prismoidal formulae used for earthwork calculation.	U	7	02																					
	d)	Mention the legal aspects of specification.	R	5	02																					
	e)	Define the term 'task work'. What is the task work for brick work in cm. for foundation and for superstructure .	R/U	6	02																					
	f)	List the points to be observed while writing the specification.	R	5	02																					
Q.5		Attempt any TWO :			16																					
	a)	Draft the detailed specification for providing cement plaster 12mm thick with cm 1:4 for Brickwork.	U	5	08																					
	b)	Prepare the rate analysis for providing & laying P.C.C. (1:2:4) bed for foundation.	A	6	08																					
	c)	Calculate the quantity of earth work for construction of a percolation tank, having the following data. a) Top width 2.5m b) R.L. of top of embankment 102.500m. c) Side slopes 1 in 2 for upstream & downstream. Refer the following table & use trapezoidal method.	A	7	08																					
		<table><tr><td>Chain</td><td>0</td><td>30</td><td>60</td><td>70</td><td>120</td><td>150</td></tr><tr><td>age in m.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>R.L. of G.L. in m.</td><td>100.5</td><td>98.50</td><td>96.50</td><td>97</td><td>98.5</td><td>100.0</td></tr></table>	Chain	0	30	60	70	120	150	age in m.							R.L. of G.L. in m.	100.5	98.50	96.50	97	98.5	100.0			
Chain	0	30	60	70	120	150																				
age in m.																										
R.L. of G.L. in m.	100.5	98.50	96.50	97	98.5	100.0																				
Q.6		Attempt any TWO :			16																					
	a)	i) State the factors affecting the rate of construction items. ii) Calculate the quantity of materials required for a R.C.C. beam of size 230mm X 450mm. The span of beam is 3m. Use M20 grade of concrete and for steel.	U	6	04																					
			A	6	04																					
	b)	Calculate the quantity of earth work for a road with the data given below using the mean area method. • Top width of the road formation – 7m. • Side slopes – 2:1 in embankment. 15:1 in cutting. • Gradient of road 1:150 (downward) • Ground levels are as below <table><tr><td>Chainage in m.</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td></tr><tr><td>R.L. of G.L. in m.</td><td>50.2</td><td>50.7</td><td>51.20</td><td>51.80</td><td>52.3</td></tr></table> • Formation level at chainage 0 is 51.4m.	Chainage in m.	0	30	60	90	120	R.L. of G.L. in m.	50.2	50.7	51.20	51.80	52.3	R	7	08									
Chainage in m.	0	30	60	90	120																					
R.L. of G.L. in m.	50.2	50.7	51.20	51.80	52.3																					
	c)	i) List the factors affecting task work of labours. ii) Calculate the quantity of materials a) For 75m ³ U.C.R. masonry in cm (1:3). b) For 130m ² area 20mm thick plastering in cm (1:4).	U	6	04																					
			A	6	04																					



Plinth projection.



(All dimensions are in mm)
(Not to scale)

Fig No-1 Question no-3

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE-JULY-2022**EXAM SEAT NO.**

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LEVEL :- THIRD PROGRAM : CIVIL ENGINEERING**COURSE CODE :- CEG 311****COURSE NAME ADVANCE CONSTRUCTION TECHNIQUES & EQUIPMENTS****MAX. MARKS : 80 TIME : 3 HRS 45 MIN. DATE :- 02/07 / 2022****Instruction :-**

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/ U/ A	Co CEG 311	Mar ks
Q.1	Attempt any FOUR :			08
	a) Write any two necessities of grouting.	U	1	02
	b) Enlist any four materials used for grouting.	R	1	02
	c) Define : Ready Mix concrete.	R	1	02
	d) List any four advanced piling techniques.	R	2	02
	e) List the two thermal methods of ground improving techniques.	R	2	02
	f) Define : Slip formwork.	R	3	02
Q.2	Attempt any FOUR :			16
	a) State the meaning of grouting and enlist the equipments for this process in civil engineering works.	U	1	04
	b) Explain the procedure for use of grouting in dam structure.	A	1	04
	c) Explain any four necessities of soil reinforcing.	U	2	04
	d) Explain about slope stabilization in embankment by soil reinforcing technique.	A	2	04
	e) State & Explain any four types of formworks used in advance construction techniques.	A	3	04
	f) Explain about Maiven Techniques of formwork with appropriate sketch.	U	3	04
Q.3	Attempt any FOUR :			16
	a) State the situations where fibre reinforced concrete is used and also state its two uses.	A	1	04
	b) Explain about drilling pattern to be adopted during grouting, according to the need and situation.	A	1	04
	c) Identify the situations where prefabricated vertical Drains are used for ground improvement and explain in brief with sketch about this technique.	A	2	04
	d) Explain in detail about chemical grouting process along with its advantages.	U	1	04
	e) Explain the process of concreting by using slip formwork technique.	U	3	04
	f) Explain the procedure of vacuum dewatering concrete (Termix)	A	1	04

Q.4	Attempt any FOUR :				08
	a) State any two types of dumper used as conveying equipments.	R	4	02	
	b) Enlist any two important uses of Graders.	R	4	02	
	c) State any two important uses of Bulldozers.	U	4	02	
	d) Enlist any two types of concrete vibrators.	R	5	02	
	e) Enlist any four types of Automatic concrete plant.	R	5	02	
	f) State any two factors affecting selection of equipment.	U	6	02	
Q.5	Attempt any FOUR :			16	
	a) Draw a neat sketch of Loader with back Hoe and write its any four advantages.	U	4	04	
	b) Explain in brief the process of production of artificial sand.	U	5	04	
	c) With neat sketch of power shovel explain its working principle.	R	4	04	
	d) State any four uses of Mast crane and Derricks each.	R	4	04	
	e) Enlist any two types of concrete mixer and explain in brief Tilting type of concrete mixture.	U	5	04	
	f) Distinguish between standard equipment and special equipment. (any four points each)	U	6	04	
Q.6	Attempt any FOUR :			16	
	a) Draw a neat sketch of Gantry crane and state its any two uses.	U	4	04	
	b) i) State any two types of belt conveyors. And Write suitability of each. (any two points)	R	5	04	
	c) Enlist any two types of concrete vibrators, write any two suitability of each.	R	5	04	
	d) Explain in brief the Bitumen Paver.	U	5	04	
	e) i) Enlist any two concreting equipments. ii) State any two advantages of each.	R	5	04	
	f) Explain in brief economic life of an construction equipment.	U	6	04	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO.

LEVEL :- **THIRD** PROGRAM : **CIVIL ENGINEERING**

COURSE CODE :- **CEG 303/CEP303**

COURSE NAME **BUILDING DRAWING**

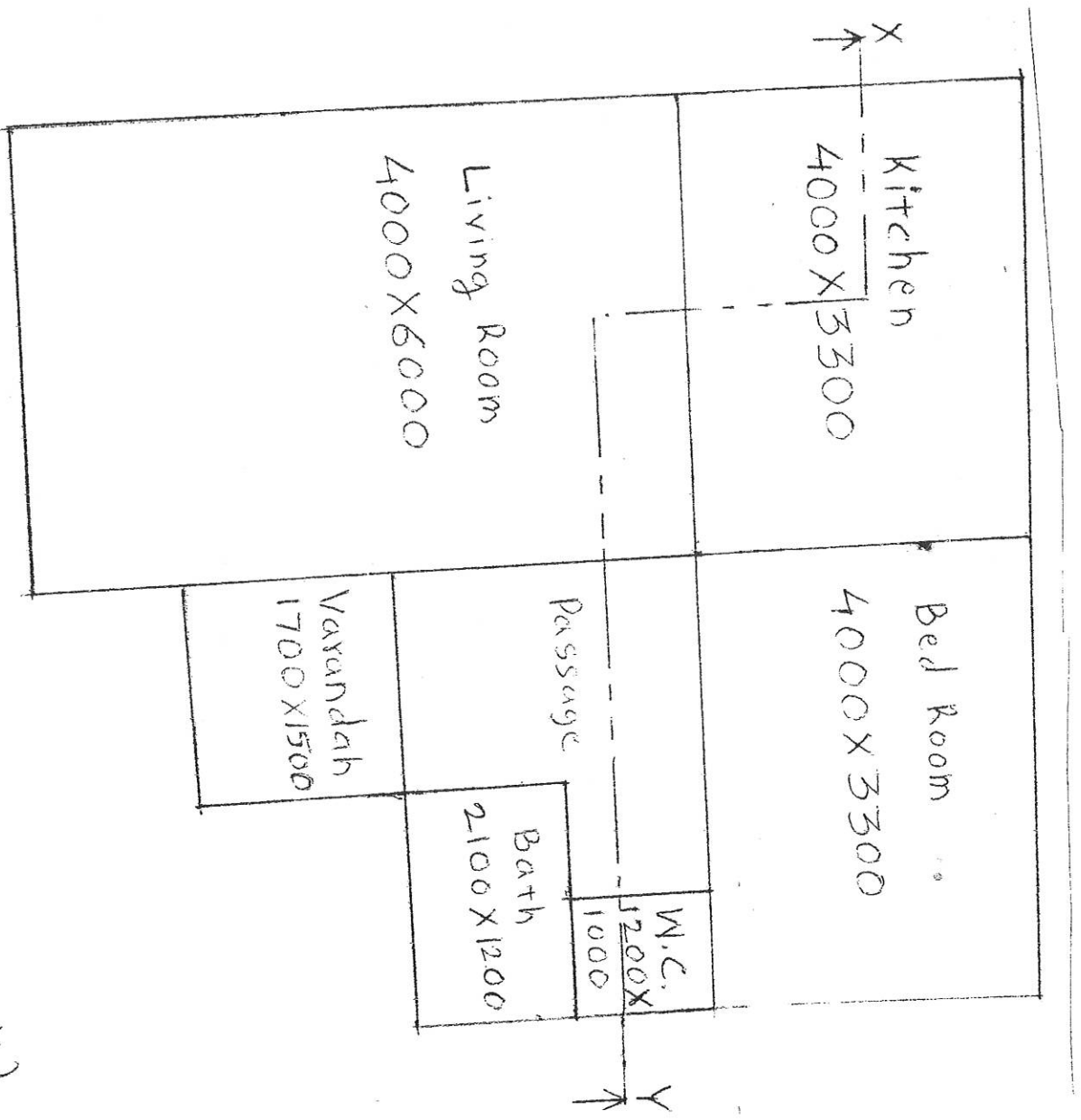
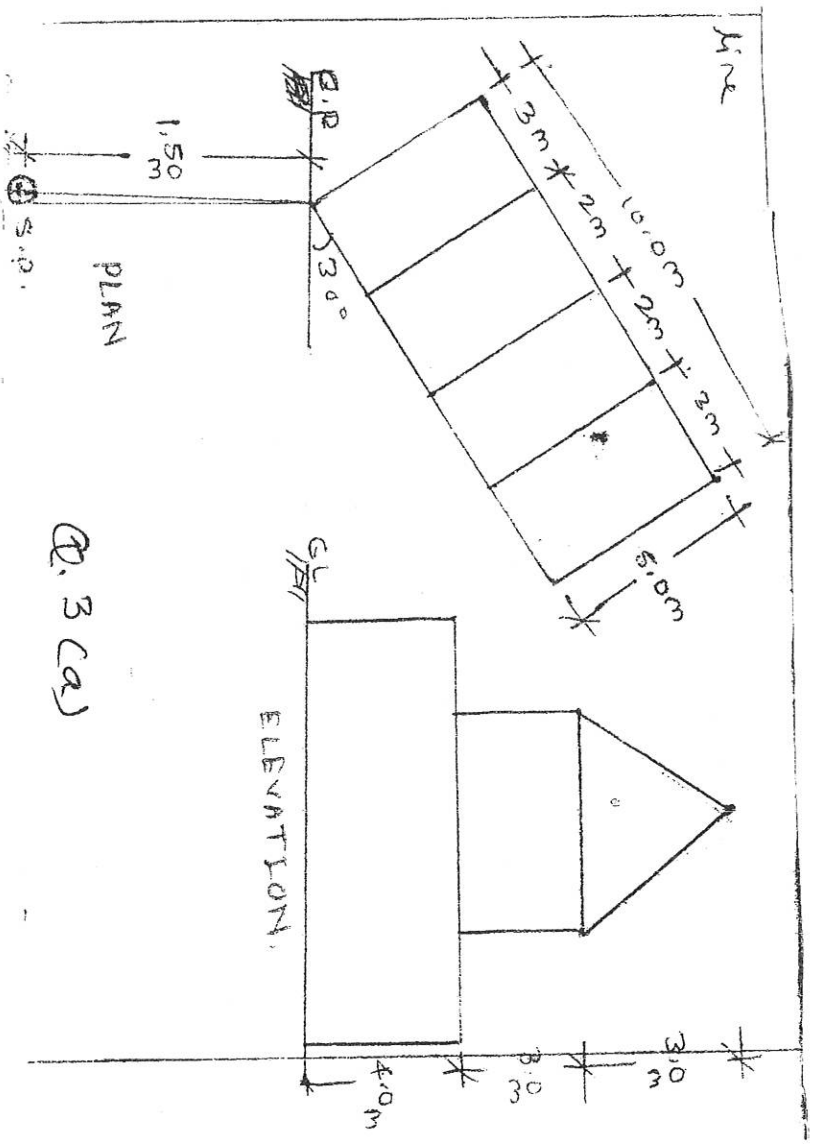
MAX. MARKS : **80** TIME : **5 HRS** DATE :- **11/07/2022**

Instruction :-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	R/	Co	Mar
	Q	U/	EG	ks
	N	A	303	
Q.1	Attempt any FOUR :			08
a)	Enlist plan sanctioning authorities.	R	2	02
b)	Draw symbols for wood and concrete as per IS 962:1989	R	1	02
c)	State any two types scales used in building drawing.	U	1	02
d)	State minimum dimensions provided for rise and tread in residential and public building.	U	3	02
e)	Define angle of vision and center of vision.	R	5	02
f)	State any two objects of bye laws.	R	2	02
Q.2	Attempt any FOUR :			16
a)	Describe orientation & Elegance of building with its importance.	U	3	04
b)	Define – a) carpet area b) Built up area c) Plot area d) F.S.I.	U	2	04
c)	State the rule of Architects and contractor in building construction work.	U	2	04
d)	State minimum standard dimensions for following units in residential building. I) W.C. ii) Bath iii) Window sill height for habitable rooms. iv) Plinth height	U	3	04
e)	Enlist types of perspective drawings and explain any one with their suitability.	U	5	04
f)	State different types of lines used in building drawing with its use and neat sketches.	R	1	04
Q.3	Attempt any TWO :			16
a)	Figure shows a plan and elevation of object, Assume eye level as 1.50m above G.L. Draw two point perspective drawing to suitable scale. Retain all construction line.	A	5	08
b)	Enlist principles of planning of building & explain any two in detail.	R	3	08
c)	Draw a line plan of a bank building for small city. Indicate the position of doors and windows along with the names and sizes of various rooms.	A	4	08

QN	S Q N		R/ U/ A	Co CEG 303	Mar ks
Q.4		Figure 'B' shows line plan of small residential building. Draw to a scale of 1:50 the following views, using the given data - Detailed developed plan. - Front elevation. - Section – X Y. - Prepare schedule of doors & windows. - Give area statement. - Shows north direction. Data: - Hard strata is available at a depth of 1000mm below G.L. - Structure is single storey load bearing structure. - Bed concrete P.C.C. (1:4:8) below foundation is 150mm thick and 900mm width. - Foundation masonry 600mm in U.C.R.. - Plinth masonry 450mm width and 600mm above G L in U.C.R. - B.B. masonry 300mm thick for main walls and 200mm thick partition wall for W.C. and bath. - Ceiling height is 3000mm from floor level. - R.C.C. slab 120mm thick and projection is 150mm from exterior face of wall. - Provide RCC lintel and chajjas on masonry openings - Provide type, size of doors and windows at suitable positions. - Provide kitchen platform, Sink, wash basin etc. at suitable positions. - Assume any other data is necessary. (Figure 'B' attached)	R	5	10 08 12 05 04 01



Q No.4 Fig B Line Plan (Not to scale)

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.							
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LEVEL: -FOURTH PROGRAM: CIVIL ENGINEERING

COURSE CODE: - CEF403

COURSE NAME:- DESIGN AND DRAFTING OF STEEL STRUCTURES

MAX. MARKS: 80 TIMES: 3Hrs.45 Min. DATE:- 11/07/2022

Instruction:-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN - Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	S	SECTION - I				R/ U/ A	Co CEF 403	Mar ks
Q.1		Attempt any FOUR :						08
	a)	Give the name of IS code used for Dead load and wind load calculation.				R	1	
	b)	Enlist four types of steel structures.				U	1	
	c)	State any two usages of steel table.				R	1	
	d)	Draw stress – strain curve and its salient features for mild steel under tension test.				U	1	
	e)	Sketch the neat diagram of i) Lap joint ii) butt joint.				U	2	
	f)	State any four differences between hinged and rigid joint.				U/ R	2	
Q.2		Attempt any TWO :						16
	a)	i) Explain physical and mechanical properties of steel structures. ii) Define limit state and explain types of limit state.				U/ R	1	
	b)	An angle strut made up of ISA 100x100x10 is connected by gusset plates of 12mm thick using 20mm diameter bolts of grade 4.6 to carry factored load of 300 KN. Design the connection with diagram.				A	2	
	c)	The tension member of truss consist of 2ISA 75x75x6mm on the same side of 10mm thick gussets plate with total 8 Nos. of 20mm diameter bolts of grade 4.6 Calculate load carrying capacity of member. Given Ag=916 mm ² , gauge = 40mm, Pitch = 40mm, end distance = 30mm.				A	3	
Q.3		Attempt any TWO						16
	a)	i) Explain the failures in bolted connection. ii) Explain the necessity of built up sections. Draw any two cross section for the same.				R	2	
	b)	A strut 2.4m long of roof truss consist of double angle 90x90x6mm back to back to 10mm thick gusset plate by welding. Calculate load carrying capacity of strut. Properties given A _{cg} = 1047mm ² C _{xx} = C _{yy} = 24.2mm, E _{xx} = E _{yy} = 27.7mm. KL/e → 100 110 120 130 140 fed (N/mm ²) → 107 94.6 8.7 74.4 69.5				A	3	
	c)					A	3	

S		SECTION - II				R/ U/ A	Co CEG 305	Mar ks
QN	QN							
Q.4		Attempt any FOUR :						08
	a)	State the meaning of laterally supported beam and also advantage of it.				R	4	02
	b)	Draw any two compound sections used for beam.				U	4	02
	c)	State any two differences between slab base and gusseted base.				R	5	02
	d)	Draw a neat diagram of sectional elevation of gusseted base				U	5	02
	e)	State function of following members in roof truss. i) Purlin ii) Strut iii) Main tie iv) Principle rafter.				R	6	02
	f)	State any two types of roof trusses with their span suitability. Also draw neat sketch.				U	6	02
Q.5		Attempt any FOUR :						16
	a)	Determine design bending strength of laterally supported beam ISMB 350 @ 514 N/m. Properties of ISMB 350 are as below- $b_f = 140\text{mm}$ $Z_{xx} = 778.9 \times 10^3 \text{ mm}^3$ $t_f = 14.2 \text{ mm}$ $I_{xx} = 1360.3 \times 10^4 \text{ mm}^4$ $t_w = 8.1 \text{ mm}$ $Z_p = 889.57 \times 10^3 \text{ mm}^3$ $r_1 = 14 \text{ mm}$				U	6	04
	b)	Define plate girder & state any six components with their functions.				R	5	04
	c)	An ISLB 300 is used to carry bending moment 80 kN.m Check adequacy of the section. Properties of ISLB 300 $A = 4808 \text{ mm}^2$ $bf = 150\text{mm}$ $I_{xx} = 7332.9 \times 10^4 \text{ mm}^4$ $Z_{xx} = 488.9 \times 10^3 \text{ mm}^3$ $t_f = 9.4 \text{ mm}$ $t_w = 6.7 \text{ mm}$ $Z_p = 554.32 \times 10^3 \text{ mm}^3$ $r_1 = 15\text{mm}$				A	4	04
	d)	Calculate the panel point live load over a roof truss, of Howe type with following data. Rise of truss = 3m Span of Truss = 16m Spacing of trusses = 3.5 m c/c Total no. of panels = 8 Also draw panel point diagram of truss.				A	6	04
	e)	Calculate wind panel point load for designing a pitched roof of a shed having span 16m & pitch $\frac{1}{4}$, $C_{pi} = \pm 0.2$ Basic wind pressure = 40 m/sec Risk probability factor = 1 Structure size factor = 0.8 Topography factor = 1 No. of panel = 8				A	6	04
	f)	State any six advantages & two disadvantages of tubular structures.				R	6	04

External wind pressure coefficient (cpe)			
Slope	Wind normal to Ridge	Wind parallel to Ridge	
	Wind ward	Near gable ward	Internal bay
20°	-0.4	-0.4	-0.6
30°	0	-0.4	-0.6

Q.6	Attempt any TWO:			16
a)	Check wheather ISMB 250 is suitable or not as a simply supported beam over an effective span of 6.0 m. It carries U.d.l. of 15 kN/m inclusive of self weight . Take check for flexure shear & deflection. Properties of ISMB 250 are $b_f = 125 \text{ mm}$ $t_f = 12.5 \text{ mm}$ $t_w = 6.9 \text{ mm}$ $I_{xx} = 5131.6 \times 10^4 \text{ mm}^4$ $Z_{xx} = 410 \times 10^3 \text{ mm}^3$ $r_1 = 13 \text{ mm}$ $Z_p = 465.71 \times 10^3 \text{ mm}^3$	A	4	08
b)	Design a suitable slab base & concrete pedestal for a column having section ISHB 300 carrying an axial load 900 kN. The bearing capacity of soil is 250 kN/m^2 . The grade of concrete is M20. Properties ISHB 300 are as below. $b_f = 250 \text{ mm}$ $t_f = 10.6$ $t_w = 7.6$	A	5	08
c)	Check suitability of unequal angle purlin ISA 100 x 75 x 8 mm with following details. 1) Dead load = 1.2 kN/m 2) Live load = 0.75 kN/m 3) Wind load = 2.0 kN/m 4) Spacing of trusses = 3 m c/c 5) Slope of truss = $\theta = 30^\circ$ 6) $I_{xx} = 131.6 \times 10^4 \text{ mm}^4$ 7) $I_{yy} = 63.3 \times 10^4 \text{ mm}^4$ 8) $C_{xx} = 31.0 \text{ mm}$ 9) $C_{yy} = 18.7 \text{ mm}$	A	6	08
