BharatiyaVidyaBhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058

T.Y. B.Tech Civil Sem VI

END SEM Examinations May 2022

17/5/22

Program: Civil Engineering **Duration: 3hr**

Course Code: PC-BTC601 **Maximum Points: 100**

Course Name: Construction Engineering and Management

Semester: VI

Instructions:

1. **Attempt any five questions.**
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss the process of post tender planning for a Highway construction project.	8	CO1 CO3	BL3	1.4.1
	b	Describe resource smoothing along with steps involved in resource smoothing.	6	CO1	BL3	1.3.1
	c	Discuss common good practices in construction projects.	6	CO2	BL1	1.4.1
2	a	Discuss the role of Client and contractor as stakeholder management side in a construction project.	6	CO1	BL2	1.4.1
	b	Draw the network of the project	10	CO2	BL5	2.3.1
		Perform CPM calculations and Find the critical path and expected project completion time. Calculate Total float, Free float, Independent Float and Interfering float.				

Activity	Immediate Predecessor(s)	Durations in (Weeks)
A	-	5
B	-	11
C	-	8
D	C	7
E	A	9
F	A,B,D	4
G	C	12
H	C	5
I	E,F,G	10
J	F,G	5
K	H	5
L	H	9
M	J,K	3
N	L	6

	c	Discuss vertical production method of a scheduling.	4	CO2	BL2	1.4.1
3	a	What is an accident? Suggest the types of personal protective equipment (PPE) to be used to minimize accidents in construction project.	6	CO2	BL2	1.4.1
	b	Draw typical project life cycle along and brief about different stages in a project	5	CO1	BL2	1.3.1
	c	Time estimates in Weeks for the activities of a PERT network are given below.	9	CO2	BL4	2.3.1

Activity	Time estimates (Weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network and identify critical path.
ii) Determine the expected project length, standard deviation and variance of project length.
iii) What is the probability that the project will be completed at least 4 weeks earlier than expected time?
iv) What is the probability that the project will be completed no more than 4 weeks later than expected time?
v) If the project due date is 19 weeks, what is the probability of not meeting the due date?
vi) Find the probability that the project will be completed on schedule if the scheduled completion time is 20 weeks.
vii) What should be the scheduled completion time for the probability of completion to be 90%?

4	a	Prepare A, B and C ranking of the different items for the data given below	8	CO2	BL3	4.1.1

Item No.	Annual consumption in Unit	Unit cost in ₹
1	14000	2.00
2	150000	2.40
3	1500	1.80
4	52500	2.80
5	2500	1.60
6	80000	1.40
7	7500	3.0
8	35000	2.20

	b	Discuss the purpose of EVM and state the significance of SV, CV, SPI, CPI, TSPI.	6	CO2	BL2	2.1.1
	c	Discuss the need of mechanization in the context of highway construction project. Also list out the equipment required for highway construction project.	6	CO1	BL2	2.1.2
5	a	Explain in details Hybrid Annuity model (HAM).	6	CO4	BL2	1.3.1
	b	Discuss health and safety precautions to be taken while using construction equipments for highway construction project.	8	CO1	BL3	2.1.1
	c	Define organization and draw a typical line and staff organization structure along with its advantages.	6	CO1	BL1	2.1.1
6	a	Differentiate security deposit and retention money.	3	CO4	BL2	2.1.2
	b	A project consists of 5 activities as shown below	12	CO3	BL4	2.3.1
		Determine optimum project completion time assuming indirect cost as ₹ 450/- per week. Draw time scaled diagram for each stage of crashing				

Activity	Time in weeks (NT)	Crash Time (CT)	Normal Cost ₹	Crash Cost ₹
1-2	5	4	600	800
1-3	3	1	400	600
1-4	8	5	900	1200
2-4	4	2	600	1200
3-4	4	3	500	700

	c	Discuss arbitration along with its advantages.	5	CO4	BL2	1.3.1
7	a	You are assigned responsibility as a site manager of High Rise Building project, which records you will maintain on site.	8	CO2	BL3	3.1.2
	b	Define lean construction and discuss forms of waste in construction.	6	CO2	BL1	1.3.1
	c	For the data given draw AON diagram	6	CO2	BL6	2.3.1
		Also determine critical path and total duration for the project				

Activity	Immediate Predecessor(s)	Durations in (Days)
A	-	5
B	A	4
C	A	7
D	A	8
E	B,C	6
F	C,D	3
G	D	10
H	E,F,G	4

Standard Normal Probabilities

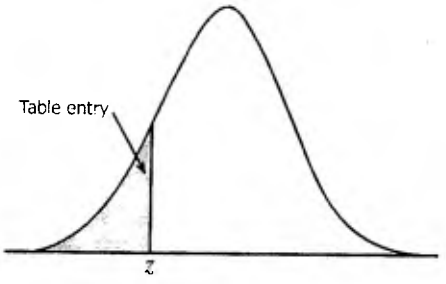

Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

Standard Normal Probabilities

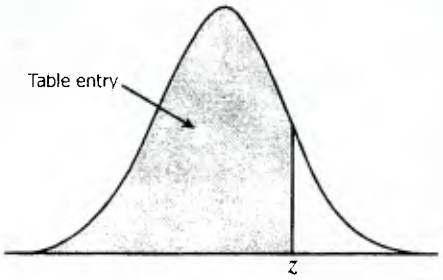

Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

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T. Y. B. Tech Civil Sem VI

Re-Examinations July 2022

Program: Civil Engineering **Duration: 3hr**

Course Code: PC-BTC601 **Maximum Points: 100**

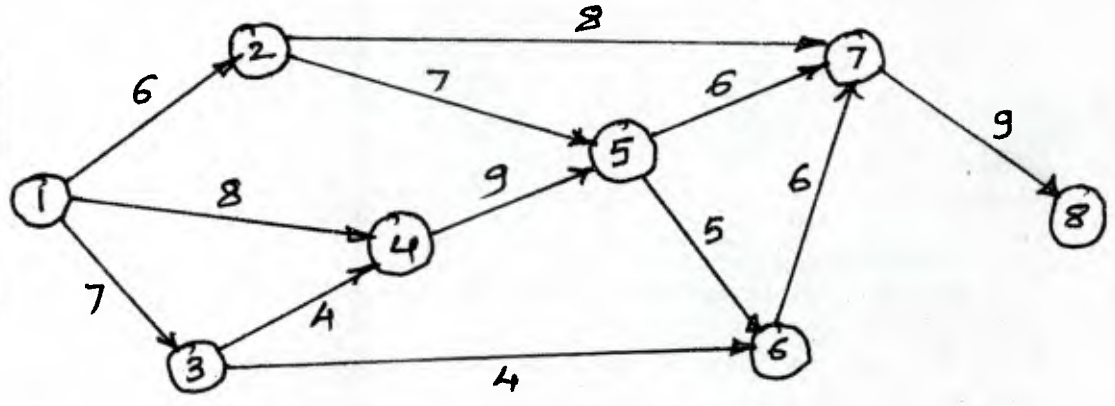
Course Name: Construction Engineering and Management

8/7/22.

Semester: VI

Instructions:

1. **Attempt any five questions.**
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss the characteristics of a construction project.	8	CO1 CO3	BL3	1.4.1
	b	Draw work breakdown structure for construction of a high rise residential building.	6	CO1	BL3	1.3.1
	c	Differentiate Conventional construction methods against Mechanized construction methods in the context of any construction project.	6	CO2	BL1	1.4.1
2	a	Discuss in detail stakeholders involved in construction project for place like Mumbai city.	5	CO1	BL2	1.4.1
	b	Determine critical path, total, free, independent and free float	9	CO2	BL5	2.3.1
						
	c	Discuss resource smoothing and resource levelling.	6	CO2	BL2	1.4.1
3	a	Define PPP and discuss characteristics of PPP contract.	6	CO2	BL2	1.4.1
	b	Draw typical project life cycle along and brief about different stages in a project	5	CO1	BL2	1.3.1
	c	Time estimates in Days for the activities of a	9	CO2	BL4	2.3.1

PERT network are given below.

Activity	Time estimates (Days)		
	Optimistic	Most Likely	Pessimistic
1-2	3	5	7
1-3	1	2	3
2-5	6	8	12
3-4	8	12	17
4-5	0	0	0
4-6	6	9	12
4-7	3	6	8
5-8	5	7	9
6-9	1	2	3
8-9	3	6	8
7-10	8	15	20
9-10	2	4	6

i) Draw the project network and identify critical path.
ii) Determine the expected project length, standard deviation and variance of project length.
iii) What is the probability that the project will be finished in 36 days.

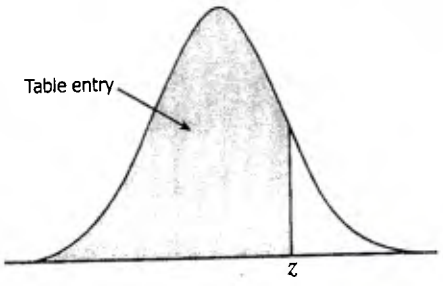
4	a	A shop dealing in construction goods has seven different items in its inventory. The average number of units of each of these items along with their unit costs is given in Table. The owner uses ABC analysis to decide the criticality of items for procurement. Classify the items as per ABC analysis.	8	CO2	BL3	4.1.1

Name of the item	Average annual consumption (No.)	Average cost per unit (in INR)
a	10000	121.50
b	10000	100.00
c	24000	14.50
d	16000	19.75
e	60000	3.10
f	50000	2.45
g	30000	0.50

	b	Discuss the purpose of EVM and state the significance of SV, CV, SPI, CPI, TSPI.	6	CO2	BL2	2.1.1
	c	Define lean construction and discuss forms of waste in construction.	6	CO2	BL1	1.3.1
5	a	Discuss in details causes of accidents in construction and means to avoid them.	8	CO4	BL2	1.3.1
	b	Discuss the causes of time and cost overruns in construction project	6	CO1	BL3	2.1.1
	c	Define organization and draw a typical line and staff organization structure along with its advantages.	6	CO1	BL1	2.1.1
6	a	Differentiate security CPM and PERT	4	CO2	BL2	2.1.2
	b	Discuss time cost tradeoff in construction	8	CO3	BL4	2.3.1

	c	Derive expression for EOQ and it importance in Materials management in construction	8	CO4	BL2	1.3.1
7	a	Draw job layout for construction of high rise building.	6	CO2	BL3	3.1.2
	b	Discuss post tender planning for a construction of high rise building.	8	CO2	BL6	2.3.1
	c	Explain clearly the following statement "CPM is deterministic and activity oriented network while PERT is a probabilistic and event oriented network.	6	CO2	BL6	2.3.1

Standard Normal Probabilities



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0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Exam – May 2022 Examinations

T.Y. B.Tech (Civil) Sem VI 19/5/22

Program: B.Tech –Civil Engineering

Course Code: PC-BTC602

Course Name: Design Of Steel Structures

Duration: 3 Hour

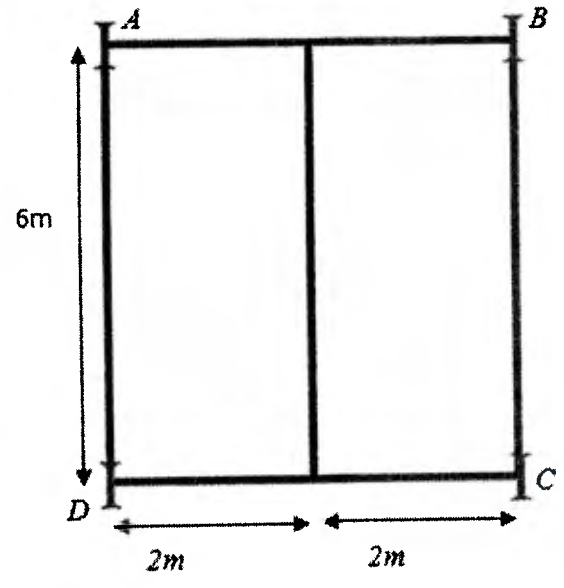
Maximum Points: 100

Semester: VI

Notes:

1. **Assume any missing data and state the same clearly**
2. **Use of IS 800-2007 and steel table is allowed**
3. **Draw neat sketches to illustrate your answers**
4. **For all steel plates and angles, fy = 250MPa, fu= 410MPa**

Q.No.	Questions	Points	CO	BL	PI
1.	The member of a roof truss carries the following unfactored loads : DL = 60kN (Tensile) LL = 40kN (Tensile) WL = 90kN (Compressive) a. What will be the design loads as per IS 800:2007 load combinations? b. Design the element as a tension member and also design its connection with 10mm thick gusset plate using 4.6grade bolts c. Check the member designed above for the safety in compression according to the load combinations generated.	20	1,2	3,4	3.1.4 3.1.6
2.a)	A single angle strut (loaded through single leg) has the following unfactored forces acting DL = 50kN, LL = 35kN, both forces being compressive in nature. The length of member between centres of intersection is 2.5m.Design the section as per IS 800:2007. *Assume the connection to be hinged with two bolts at each end*	10	1,2	3	3.1.4 3.1.6
2.b)	A column carries a design axial load of 1000kN. Design the column section using rolled steel section when *One end is restrained against rotation and translation while other is restrained against translation only.* Length of member is 4.2m	06	1,2	3	3.1.4 3.1.6

2.c)	Explain the various failure modes of compression members	04	1	1,2	1.4.1 2.1.3
3.	Design a built up laced column to carry 1400kN design axial load using two channels facing back to back. Also design lacing and its connection using 4.6grade bolts. The column is hinged at both ends and the length is 4.5m. Draw neat sketch showing all the details	20	1,2	3	3.1.4 3.1.6
4.a)	A floor of hall has beam layout as shown in figure below:  Design beam AB*(simply supported).* Loads are as follows : RCC slab depth = 125mm Floor finish load = 1.5kN/m^2 Live load = 2.5kN/m^2 Wall thickness = 230mm (All beams support walls of height 2.5m) Design the beam and provide all necessary checks *assuming the beam to be laterally supported*	14	1,2	3,4	3.1.4 3.1.6
4.b)	Explain the procedure for wind load calculations on roof truss	06	2	1,2	1.4.1 2.1.3
5.a)	Design a framed connection for an ISMB 300*(secondary beam)* to transfer 120kN factored reaction to ISMB 450*(main beam)* using 4.6grade bolts. Draw neat sketch to show connection details	10	1,2	3	3.1.4 3.1.6

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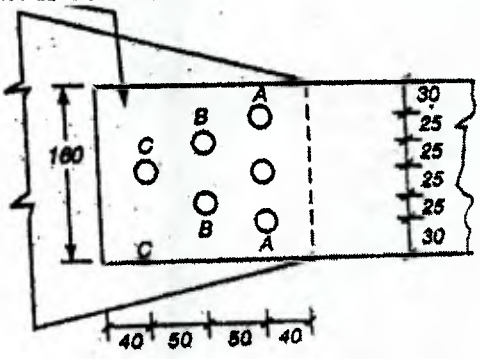
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Exam – May 2022 Examinations

5.b)	Explain the necessity of column bases. What is the use of steel base plate in column base ?	04	1	1,2	1.4.1 2.1.3
5.c)	Explain the advantages and disadvantages of welding	06	1	1,2	1.4.1 2.1.3
6.a)	Determine the design tensile strength of the plate as shown in the figure. The plate is connected by 20mm dia bolts and thickness of plate is 10mm.  *(all dimensions are in mm)*	08	1	3	3.1.4 3.1.6
6.b)	Design a welded connection for a single angle tension member ISA 100x100x10. The angle is subjected to an axial force of 120kN.	08	1	3	3.1.4 3.1.6
6.c)	Explain various modes of failure in bolted joints	04	1	1,2	1.4.1 2.1.3
7.a)	Explain the classification of sections : plastic, compact, semi-compact and slender based on moment – rotation characteristics	06	1	1,2	1.4.1 2.1.3
7.b)	A simply supported beam ISMB 350@ 52.4kg/m has been used over a span of 7m to carry a design load of 25kN/m. check the safety of the beam in *shear, flexure and deflection* when the beam is ***laterally unsupported***	10	1,2	3	3.1.4 3.1.6
7.c)	Explain rigid, semi-rigid and pinned types of connections.	04	1	1,2	1.4.1 2.1.3

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(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058

Re- Exam – July 2022 Examinations

T.Y. B.Tech Civil Sem VI

Program: B.Tech –Civil Engineering | **Duration: 3 Hour**

Course Code: PC-BTC602 | **Maximum Points: 100**

Course Name: Design Of Steel Structures | **Semester: VI**

11/7/22.

Notes:

1. **Assume any missing data and state the same clearly**
2. **Use of IS 800-2007 and steel table is allowed**
3. **Draw neat sketches to illustrate your answers**
4. **For all steel plates and angles, fy = 250MPa, fu= 410MPa**

Q.No.	Questions	Points	CO	BL	PI
1.a)	The member of a roof truss carries the following unfactored loads DL = 80kN (Tensile) LL = 50kN (Tensile) WL = 100kN (Compressive) Calculate the loads as per all possible load combinations according to IS800-2007 and specify the design loads to be used	03	1,2	3,4	3.1. 3.1.
1.b)	Design a tension member to carry an axial factored load of 300kN. Use a single angle rolled steel section connected (at site) to each side of a gusset plate of 10mm thick using 20mm diameter bolts of grade 4.6.	12	1,2	3,4	3.1. 3.1.
1.c)	Calculate the number of bolts required to connect two plates of l120mm x 8mm size in lap joint, to transmit a factored load of 120 KN. Use 12 mm bolts of grade Fe 410	05	1,2	3,4	3.1. 3.1.
2.a)	A single angle strut (loaded through single leg) has the following unfactored forces acting DL = 70kN, LL = 25kN, both forces being compressive in nature. The length of member between centres of intersection is 2.9m.Design the section as per IS 800:2007. *Assume the connection to be hinged with two bolts at each end*	10	1,2	3	3.1. 3.1.
2.b)	A column carries a design axial load of 1250kN. Design the column section using rolled steel section when *both ends are restrained against rotation and translation.* Length of member is 5m	07	1,2	3	3.1. 3.1.

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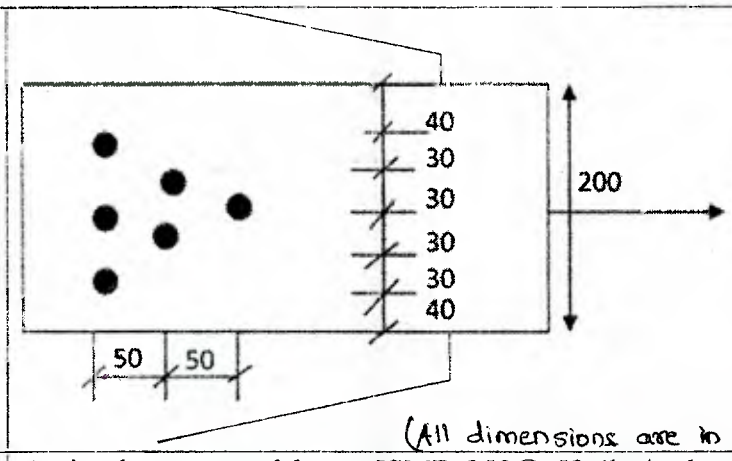
Re- Exam – July 2022 Examinations

2.c)	Calculate live load on truss if the angle of slope of roof is 30°.	03	1	1,2	1.4 2.1
3.	Design a built up laced column to carry 1500kN design axial load using two channels facing back to back. Also design lacing and its connection using 4.6grade bolts. The column is fixed at both ends and the length is 5.5m. Draw neat sketch showing all the details	20	1,2	3	3.1 3.1
4.a)	Design a simply supported beam of span 5m carrying an RC floor capable of providing lateral restraint to the top compression flange. The design UDL is made up of 20-kN/m imposed load and 15 kN/m dead load. Provide all checks.	14	1,2	3,4	3.1 3.1
4.b)	State the merits and demerits of using steel as a structural material	06	2	1,2	1.4 2.1
5.a)	Design a framed connection for an ISMB 300*(secondary beam)* to transfer 135kN factored reaction to ISMB 450*(main beam)* using 4.6grade bolts. Draw neat sketch to show connection details	10	1,2	3	3.1 3.1
5.b)	Briefly describe the types of column bases used in steel structures	05	1	1,2	1.4 2.1
5.c)	Explain the advantages and disadvantages of bolting	05	1	1,2	1.4 2.1
6.a)	A roof truss shed is to be built in Chennai for an industry The size of shed is 20mx8m.The height of building is 10m at the eaves. Determine the basic wind pressure.	04	1	3	3.1 3.1
6.b)	Design a welded connection for a single angle tension member ISA 100x100x10. The angle is subjected to an axial force of 135kN.	10	1	3	3.1 3.1
6.c)	Explain the classification of sections : plastic, compact, semi-compact and slender based on moment – rotation characteristics	06	1	1,2	1.4 2.1
7.a)	Determine the design tensile strength of the plate 200 x 10mm with the holes as shown below. M20 bolts and 10mm thick plates are used.	10	1	1,2	1.4 2.1

	 (All dimensions are in mm)				
7.b)	A simply supported beam ISMB 350@ 52.4kg/m has been used over a span of 5m to carry a design load of 18.5kN/m. check the safety of the beam in *shear, flexure and deflection* when the beam is ***laterally unsupported***	10	1,2	3	3.1 3.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination

May 2022

21/5/22

Program: UG Civil T.Y. B.Tech Civil
Course Code: PC-BTC603
Course Name: Foundation Engg. Sem VI

Duration: 3 Hours
Maximum Points: 100
Semester: VI

Notes:

- **Question 1 is compulsory**. Attempt **any 4 out of remaining** questions
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained,** and **Bloom's Taxonomy Level**

Q. No.			Points	CO	BL
1	a	Differentiate between Rankine and Coulomb's theory of earth pressure.	5	2	4
	b	Discuss the limitations of the plate load test	5	1	2
	c	A bored pile of 40 cm diameter is installed in clayey soil with undrained cohesion of 75kN/m^2. Design the length of the pile required to carry a safe load of 350kN, using a factor of safety of 3.0 and $\alpha = 0.58$.	5	1	6
	d	Explain a ditch conduit and a positive projecting conduit with neat sketches.	5	1	3
2	a	A contractor at a site is refusing to put adequate drainage behind a retaining wall. Convince him why an appropriate drainage system is necessary	5	2	5
	b	Justify the use of a combined piled raft foundation for a high rise project.	5	1	5
	c	Design a cantilever sheet pile wall retaining cohesionless soil of height 6 m, with drained friction angle of 32°, unit weight of 19.6 kN/m^3, and GWT is deep below (> 100m). The wall may be assumed to be smooth and simplified method may be adopted. Draw a neat sketch of the same.	10	2	6

3	a	Explain how reinforced earth can be applied to make construction sustainable and economic.	5	2	2
	b	Explain the conditions when negative skin friction can occur in piles and if it is desirable. If not, explain how the condition can be overcome.	5	1	2
	c	A foundation of size 2 m x 1.5 m is constructed at a depth of 1.0 m below ground surface of uniform sandy gravel having a friction angle of 35°, bulk density of 19.8 kN/m^3 above water table and a submerged density of 11.0 kN/m^3. Determine the net ultimate bearing capacity of the foundation as per IS code recommendations if: a. GWT is 3.0 m below ground surface. b. GWT rises to 1.5 m below ground surface.	10	1	4
4	a	Can dynamic formulae be used for estimating pile capacity of bored piles? Discuss other conditions where these formulae are not suitable.	5	1	2
	b	Differentiate between general, local and punching shear failure	5	1	4
	c	A retaining wall is 8 m high with sand back fill in top 5.5 m (γ_d = 18.5 kN/m^3, ϕ = 34°) and saturated sandy clay below it (γ_{sat} = 20.3 kN/m^3, ϕ = 28°, c = 17 kPa). The ground water table is at the interface of the two layers. Sketch the lateral earth pressure distribution if the wall is expected to move away from the backfill.	10	2	3,4
5	a	Explain the following terms: Ultimate bearing capacity, safe bearing capacity and allowable bearing capacity	5	1	2
	b	Explain the construction of an imperfect ditch conduits with neat sketches	5	1	2,3
	c	Determine the maximum and minimum pressure under the base of a cantilever retaining wall shown in Fig. 1. The soil parameters are c= 0, ϕ=40° and γ= 17 kN/m^{3}and the angle of friction at the base may be taken as 30°. Assuming $\gamma_{concrete}$= 23.5kN/m^{3}and no friction between soil and stem of wall, also	10	2	4

		estimate the factor of safety against sliding.			

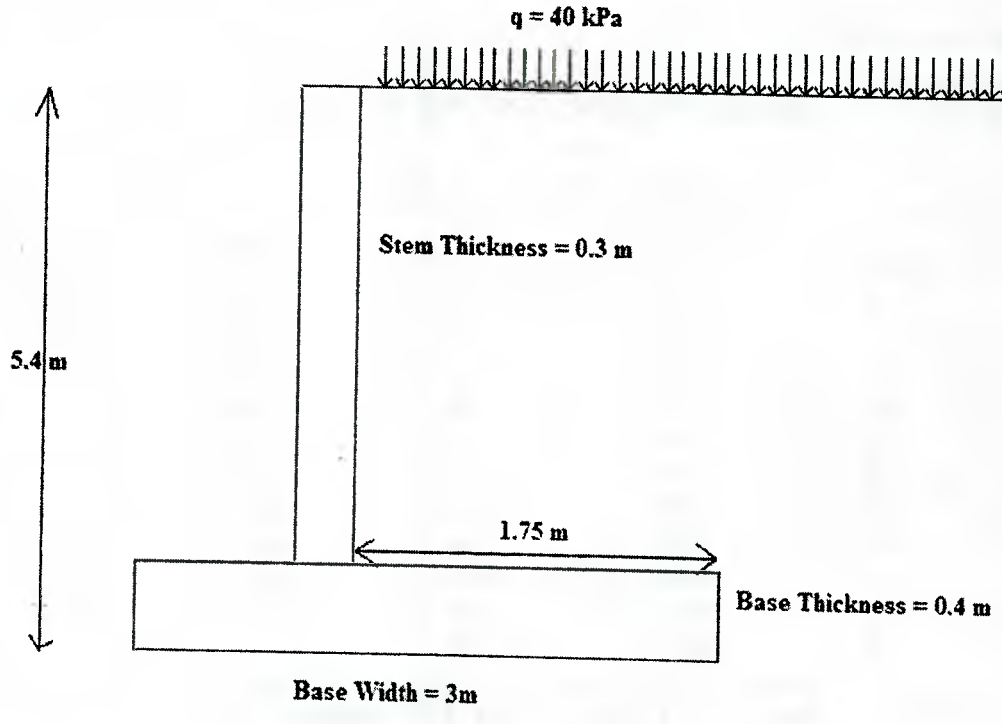


Figure 1: Retaining wall details

6	a	Design a combined footing for two columns A and B using the following data. The allowable soil pressure is 70kN/m^2 and the columns are spaced 3 m center to center. The footing should not extend 0.5m beyond center of column A. Show the arrangement with all dimensions.	10	1	6

Column	A	B
Size	0.3m x 0.3m	0.4m x 0.4m
Load	500 kN	1000kN

	b	A 50cm diameter pile with length of 15m, is driven into a deposit of sand having ϕ=32°, γ_b=17.2kN/m^3 and γ_{sat}=18.2 kN/m^3. Assuming critical depth as 15d, ground water table at a depth of 2.5m below ground surface, N_q=32 and k.tanδ as 1.13, estimate the safe load the pile can carry. Use separate suitable factors of safety for skin friction and end bearing and explain why separate factors of safety are recommended.	10	1	5

IS 6403 : 1981

TABLE 1 BEARING CAPACITY FACTORS
(Clause 5.1.1)

ϕ (Degrees)	Bearing Capacity Factors		
	N_c	N_q	$N\gamma$
0	5·14	1·00	0·00
5	6·49	1·57	0·45
10	8·35	2·47	1·22
15	10·98	3·94	2·65
20	14·83	6·40	5·39
25	20·72	10·66	10·88
30	30·14	18·40	22·40
35	46·12	33·30	48·03
40	75·31	64·20	109·41
45	138·88	134·88	271·76
50	266·89	319·07	762·89

NOTE — For obtaining values of N'_c, N'_q and $N'\gamma$, calculate $\phi' = \tan^{-1}(0.67 \tan \phi)$. Read N_c, N_q and $N\gamma$, from the Table corresponding to the value of ϕ' instead of ϕ which are values of N'_c, N'_q, $N'\gamma$ respectively.

5.1.2 The ultimate net bearing capacity obtained in 5.1.1 for strip footing shall be modified to take into account, the shape of the footing, inclination of loading, depth of embedment and effect of water table. The modified bearing capacity formulæ are given as under:

a) In case of general shear failure q_d } $= cN_c s_c d_c i_c + q(N_q - 1) s_q d_q i_q + \frac{1}{2} B\gamma N\gamma s_\gamma d_\gamma i_\gamma W'$

b) In case of local shear failure q'_d } $= \frac{2}{3} cN'_c s_c d_c i_c + q(N'_q - 1) s_q d_q i_q + \frac{1}{2} B\gamma N'\gamma s_\gamma d_\gamma i_\gamma W'$

5.1.2.1 The shape factors shall be as given in Table 2.

TABLE 2 SHAPE FACTORS

Sl. No.	Shape of Base	Shape Factor		
		s_c	s_q	$s\gamma$
i)	Continuous strip	1·00	1·00	1·00
ii)	Rectangle	$1+0.2\,B/L$	$1+0.2\,B/L$	$1-0.4\,B/L$
iii)	Square	1·3	1·2	0·8
iv)	Circle	1·3	1·2	0·8

Use B as the diameter in the bearing capacity formula.

Figure 2: IS 6403 – 1981 relevant clauses

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

Re- Examination

12 July 2022

T.Y. B.Tech (Civil) Sem VI

Program: UG Civil
Course Code: PC-BTC603
Course Name: Foundation Engineering

Duration: 3 Hours
Maximum Points: 100
Semester: VI

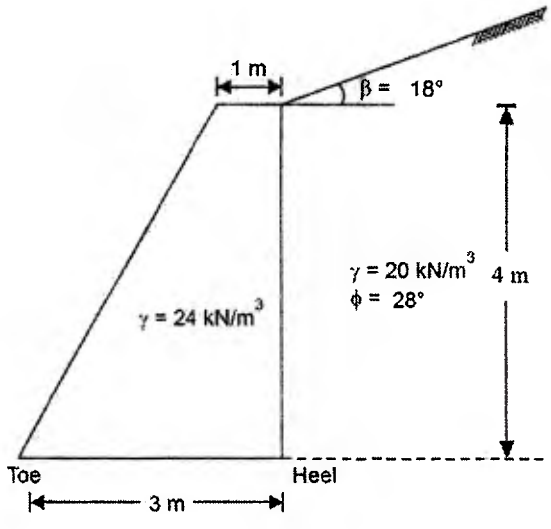
12/7/22

Notes:

- **Question 1 is compulsory**. Attempt **any 4 out of remaining** questions
- Answer each new question on a new page. But group all sub-questions together.
- Assume **suitable data** if necessary and **state it clearly**
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained, Bloom's Taxonomy Level,** and **performance indicators**

Q. No.			Points	CO	BL	PI
1	a	Calculate the earth pressure coefficients for active, at rest and passive conditions for a cohesionless soil with $\phi = 34°$.	5	2	3	1.4.1
	b	What are the factors that determine the minimum depth of shallow foundations? Discuss briefly.	5	1	2	1.4.1
	c	Discuss classification of pile foundations based on material and on method of installation	5	1	5	1.4.1
	d	A rigid water pipe of diameter 2.5 m is to be laid in a ditch which is 3.5 m wide at the top of the pipe. It is to be covered with 3 m of clayey backfill having unit weight of 19 kN/ m^3. Calculate the load on the pipe if $C_d = 3.5$. What will be the load if this pipe is flexible?	5	1	3	1.4.1
2	a	Explain the conditions when local shear failure is possible under shallow foundation.	5	1	2	1.4.1
	b	State the advantages of a reinforced earth wall as compared to a gravity retaining wall	5	2	2,5	2.2.4
	c	A 4m high trapezoidal masonry retaining wall is 1 m wide at top and 3 m wide at its bottom. See Figure 1.	10	2	5	2.4

		The wall retains backfill soil ($\phi = 28°$) at an angle of 18° with the horizontal. Determine the maximum and minimum intensities of pressure acting at the base of the retaining wall. Unit weights of soil and masonry are 20 kN/m^3 and 24 kN/m^3, respectively. Compute the factor of safety against sliding and overturning and comment on the same. Assume the coefficient of friction at the base of the wall as 0.50.				



$$K_A = \cos\beta \times \frac{\cos\beta - \sqrt{\left(\cos^2\beta - \cos^2\phi\right)}}{\cos\beta + \sqrt{\left(\cos^2\beta - \cos^2\phi\right)}}$$

Figure 1: Retaining wall details

3	**a**	Estimate the load carrying capacity of a 15 m long, 600 mm diameter pile driven in clay having following properties: 0-2.5 m – c_u = 0.5 t/m^2, α = 0.85 2.5-6 m - c_u = 1.4 t/m^2, α = 0.66 Below 6 m - c_u = 2.5 t/m^2, α = 0.52	**10**	**1**	**6**	**1.4.1**
	b	A strip footing having width of 2 m is constructed at a depth of 1.5 m below ground surface of soil having a friction angle of 30°, cohesion of 10 kPa, bulk unit weight of 18 kN/m^3 above water table and a saturated unit weight of 21.0 kN/m^3. Determine the net ultimate bearing capacity of the foundation as per IS code recommendations if GWT is 1.5 m below ground surface. Neglect depth factors.	**10**	**1**	**6**	**1.4.1**

4	a	A smooth backed vertical wall is 6.3 m high and retains a soil with a bulk unit weight of 18 kN/m^3 and $\phi = 18°$. The top of the soil is level with the top of the wall and is horizontal. If the soil surface carries a uniformly distributed load of 45 kN/m^2, determine the total active thrust on the wall and its point of application.	**10**	**2**	**5**	**1.4.1**
	b	A 2 x 2 group of piles with diameter 30 cm and length of 9 m is driven in cohesionless soil. The soil dry unit weight is 18 kN/m^3 and saturated unit weight is 19.62 kN/m^3. GWT is at 3 m below ground surface. Assuming critical depth as 6 m, ktanδ = 1.35, N_q =100, spacing as 3d, compute the group capacity of the piles.	**10**	**1**	**6**	**1.4.1**
5	a	Differentiate between shallow foundations and deep foundations	**5**	**1**	**5**	**2.2.4**
	b	Explain classification of conduits	**5**	**1**	**2**	**1.4.1**
	c	Two load tests were conducted at a site: one with a square test plate of side 0.5 m each and the other with a square test plate of side 1.0 m each. For a settlement of 25 mm, the loads were found to be 60 kN and 180 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing, 2 m × 2 m, can carry with the settlement not exceeding 25 mm using Housel's method.	**5**	**1**	**5**	**1.4.1**
	d	What is an initial pile load test and how is it different from a routine pile load test?	**5**	**1**	**5**	**2.2.4**
6	a	Discuss the method of carrying out a plate load test as per IS1888: 1982. How are results interpreted?	**10**	**1**	**1, 2**	**1.4.1**
	b	Geotechnical investigations at a site have revealed the soil strata as shown in the table below. If a pile group of 3x4 in constructed at this site, with pile length of 12 m, diameter of 400 mm and spacing of 3d, estimate the consolidation settlement of the clay strata if the expected load is 300t.	**10**	**1**	**5**	**1.4.1**

Depth	Strata	Remarks
0.0 m to 3.0 m	Sand	$\gamma = 17.5$ kN/m^3
3.0 m to 15.0 m	Saturated Sand	GWT 3 m below GL; γ_{sat} =22 kN/m^3
15.0 m to 25.0 m	Clay	$C_c = 0.44$, e_o=1.2, γ_{sat} = 19.2 kN/m^3
25.0 m	Intact Rock	

IS 6403 : 1981

TABLE 1 BEARING CAPACITY FACTORS
(Clause 5.1.1)

ϕ (Degrees)	Bearing Capacity Factors N_c	N_q	$N\gamma$
0	5·14	1·00	0·00
5	6·49	1·57	0·45
10	8·35	2·47	1·22
15	10·98	3·94	2·65
20	14·83	6·40	5·39
25	20·72	10·66	10·88
30	30·14	18·40	22·40
35	46·12	33·30	48·03
40	75·31	64·20	109·41
45	138·88	134·88	271·76
50	266·89	319·07	762·89

NOTE — For obtaining values of N'_c, N'_q and $N'\gamma$, calculate $\phi' = \tan^{-1}(0.67 \tan \phi)$. Read N_c, N_q and $N\gamma$ from the Table corresponding to the value of ϕ' instead of ϕ which are values of N'_c, N'_q, $N'\gamma$ respectively.

5.1.2 The ultimate net bearing capacity obtained in **5.1.1** for strip footing shall be modified to take into account, the shape of the footing, inclination of loading, depth of embedment and effect of water table. The modified bearing capacity formulæ are given as under:

a) In case of general shear failure q_d } $= cN_c s_c d_c i_c + q(N_q - 1) s_q d_q i_q + \frac{1}{2} B\gamma N\gamma s_\gamma d_\gamma i_\gamma W'$

b) In case of local shear failure q'_d } $= \frac{2}{3} cN'_c s_c d_c i_c + q(N'_q - 1) s_q d_q i_q + \frac{1}{2} B\gamma N'\gamma s_\gamma d_\gamma i_\gamma W'$

5.1.2.1 The shape factors shall be as given in Table 2.

TABLE 2 SHAPE FACTORS

Sl No.	Shape of Base	Shape Factors s_c	s_q	s_γ
i)	Continuous strip	1·00	1·00	1·00
ii)	Rectangle	$1+0.2\,B/L$	$1+0.2\,B/L$	$1-0.4\,B/L$
iii)	Square	1·3	1·2	0·8
iv)	Circle	1·3	1·2	0·6

Use B as the diameter in the bearing capacity formula.

Figure 2: IS 6403 – 1981 relevant clauses

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T.Y. B. Tech (Sem VI) & Sem VIII 23/5/22

END SEM Examinations May 2022

Program: Civil/Mech/Elect Engineering **Duration: 3hr**

Course Code: (OE-BTC 613 & OE-BTC 813) **Maximum Points: 100**

Course Name: Watershed Development & Management **Semester: VI/VIII**

Instructions:

1. **Attempt any five questions.**
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	What are the causes of watershed deterioration? Explain in detail.	6	CO2	BL2	1.4.1
	b	A watershed has following data as given below Area of watershed= 9km^2,Distance between the outlet & further most point=10km,Total length of channel of various order=450km,Elevation difference between outlet and further most point = 670m,Find drainage density, form factor, channel slope and average overland flow length.	6	CO2	BL3	2.1.3
	c	Explain in detail factors affecting runoff in a watershed.	8	CO1	BL1	1.4.1
2	a	Discuss components of watershed management programme along with its significance.	6	CO2	BL2	2.1.1
	b	Explain the factors affecting infiltration in a watershed.	6	CO1	BL2	2.1.1
	c	Explain in detail urban recharge structure for RTRWH.	8	CO2	BL3	1.4.1
3	a	State the characteristics of watershed along with their importance regarding watershed management.	6	CO1	BL2	2.2.4
	b	Explain in detail types of soil erosion in a watershed	10	CO1	BL3	2.1.1
	c	Brief about RWH dam constructed at Una in Himachal Pradhesh.	4	CO1	BL3	2.1.1
4	a	Calculate the availability of water in Roof Top RWH system for a group of 4 family members. Size of roof is 12 m X10 m, with average annual rainfall is 1000 mm and runoff coefficient is 0.8. Also calculate availability of water for number of days along with its %. Daily consumption of water is 120lits/capita/day.	6	CO2	BL3	1.4.1
	b	Discuss in detail the process of wind erosion in a watershed.	8	CO1	BL2	1.4.1
	c	Classify bench terraces as per slope and also draw neat labelled diagram.	6	CO1	BL1	2.1.2

5	a	Discuss the watershed development component of PMKSY along with the objectives of PMKSY.	6	CO1	BL1	2.1.2
	b	Discuss in depth the factors affecting soil erosion in a watershed.	6	CO1	BL2	2.3.2
	c	Discuss about issues faced by people of Hiware Bazar prior to watershed development.	8	CO1	BL1	1.3.1
6	a	Draw neat labeled diagram of first flush lock and sand bed filter.	6	CO2	BL2	2.1.2
	b	What are the salient features of integrated watershed management Program?	8	CO2	BL4	1.3.1
	c	Discuss the criteria for site selection of check dam and also discuss design criteria of a check dam.	6	CO2	BL4	1.3.1
7	a	What are the roles and responsibilities of Watershed development team (WDT)?	6	CO2	BL2	3.1.2
	b	Discuss in detail the process of wind erosion in a watershed.	6	CO1	BL1	2.3.2
	c	You have been assigned as a responsibility for the development of a particular watershed, discuss about the data required for the watershed development project.	8	CO2	BL4	3.1.2

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Munshi Nagar, Andheri (West), Mumbai – 400058

T. Y. B. Tech (Civil) Mech / Elect Sem VI

Re-Examinations July 2022

Program: Civil/Mech/Elect Engineering **Duration: 3hr**

Course Code: (OE-BTC 613 & OE-BTC 813) **Maximum Points: 100**

Course Name: Watershed Development & Management **Semester: VI/VIII**

12/7/22.

Instructions:

1. **Attempt any five questions.**
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss the effect of land use change on hydrological cycle.	5	CO1	BL2	1.3.1
	b	Discuss land capability classification.	8	CO1	BL1	1.3.1
	c	Explain in detail factors affecting runoff in a watershed.	7	CO1	BL1	1.4.1
2	a	Discuss components of watershed management programme along with its significance.	6	CO2	BL2	2.1.1
	b	Discuss the classification of watershed on the basis of land use.	6	CO1	BL1	1.3.1
	c	Explain in detail Roof Top Rainwater harvesting structure.	8	CO2	BL3	1.4.1
3	a	Explain in detail Characteristics of Watershed.	8	CO1	BL1	1.2.1
	b	Explain in detail types of soil erosion in a watershed.	8	CO1	BL3	2.1.1
	c	Draw neat labeled sketch of watershed.	4	CO1	BL3	2.1.1
4	a	Calculate the availability of water in Roof Top RWH system for a group of 5 family members. Size of roof is 15 m X10 m, with average annual rainfall is 1000 mm and runoff coefficient is 0.85. Also calculate availability of water for number of days along with its %. Daily consumption of water is 120lits/capita/day.	6	CO2	BL3	1.4.1
	b	Discuss in detail filters required in rainwater harvesting structure.	8	CO1	BL2	1.4.1
	c	Discuss the importance of soil erosion studies in a watershed.	6	CO1	BL1	2.1.2
5	a	Discuss in detail the process of wind erosion in a watershed.	6	CO1	BL1	2.3.2
	b	Discuss design criteria for bund construction.	6	CO1	BL2	2.3.2
	c	Discuss engineering measures for soil conservation.	8	CO2	BL2	1.3.1

6	a	Discuss about district watershed development committee.	6	CO2	BL2	2.1.2
	b	Classify bench terraces as per slope and also draw neat labelled diagram.	6	CO1	BL1	2.1.2
	c	Discuss how watershed management programme helped the people of Hiware Bazar village.	8	CO1	BL1	1.3.1
7	a	Classify and discuss check dams.	8	CO2	BL2	3.1.2
	b	Brief about the initiatives taken by Government of India.	4	CO2	BL4	3.1.2
	c	Discuss in detail classification of bund.	8	CO2	BL4	3.1.2

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End Semester May 2022 Examinations

T.Y. B.Tech (Civil/Mech) Sem VI

Program: B. Tech. Civil /Mech. Engineering **Duration: 3hrs.**

23/5/22

Course Code: OE-BTC612 **Maximum Points: 100**

Course Name: Sustainable Development **Semester: VI**

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 is COMPULSORY.**
3. **From the remaining SIX Questions Solve ANY FOUR.**
4. **Assume suitable data, wherever necessary and State it clearly.**
5. Write **answer to each question on a new page.**
6. Answers to be accompanied with **appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart** wherever necessary or required.

Q.No.	Questions	Points	CO	BL	PI
1.	**Answer the following:**				
	1. In which report was the term sustainable development defined for the first time and accepted worldwide? (1) 2. _____ is not a part of SDG target to be achieved by 2030. (1) (primary and secondary education to all, higher education to all) 3. W.r.t the UN SDG, _____ is SDG 10. (1) (reduced inequalities, zero hunger, climate action, economic growth) 4. At the central govt., _____ plays the role of overseeing the implementation of SDGs of India. (1) 5. SDG___ will target to water availability of all and its permanent management upto 2030 in India.(1) 6. SDG 13 is about _____. (1) 7. Define 'Carbon trading'. (2) 8. State the objective of Clean Development Mechanism. (2) 9. Differentiate Paris agreement & Kyoto protocol (only two points). (2) 10. State the years of the following Acts of India: Water Act, Air Act, Environment protection Act. (3) 11. Explain in short 'SDG Index Score'. (2) 12. Name any three international green building rating systems. (3)	**20**	**1,2,3,4**	**1**	**7.1.1**
2.A	Explain 'Global Warming'. (2) State the causes and effects of global warming. (4) Explain in detail, based on the available literature by IPCC, the influence of greenhouse gases (GHGs) on global warming.(4)	**10**	**2**	**2,3**	**7.1.2**
2.B	State the factors affecting the Indian Economy. (5) State the guiding principles that can be used for planning or designing the sustainable development strategies (SDS).(5)	**10**	**4**	**2**	**7.1.4**

3.A	Explain the normative and descriptive form of sustainability (SD & SDG). (3) Describe the 'Craft of SDG'.(3) Give the strategic areas of SDG Action plan. (4)	**10**	**1**	**2**	
3.B	Write a note on 'Principles of Equity and Common but Differentiated Responsibilities and Respective Capabilities'.	**10**	**1**	**2**	**7.1.1**
4.A	Explain the 'Global energy consumption' w.r.t some facts and figures. (5) State the Need of renewable energy in present world along with the Challenges to explore and utilize it. (5)	**10**	**2**	**2,3**	**7.1.3**
4.B	Describe the 'GRIHA' green building rating system. (5) Give the assessment / criteria of GRIHA for existing buildings. (5)	**10**	**2**	**2,3**	**7.1.3**
5.A	Write a note on 'Meta principle of Sustainability'. (4) State the basic requirements of a sustainability assessment. (6)	**10**	**4**	**2**	**7.1.2**
5.B	State the sustainability assessment tools. (2) Explain any two tools with appropriate example in detail. (8)	**10**	**4**	**2,3**	**7.1.2**
6.A	Write a note on: i. Perspectives on Sustainability'. (5) ii. Global trends of GHG emissions. (5)	**10**	**1**	**1,2**	**7.1.1**
6.B	Explain in detail the outcomes of the environmental issues addressed by the following international environmental agreements: i. Kyoto protocol 1997. (5) ii. Paris agreement 2016. (5)	**10**	**2**	**2,3**	**7.1.1**
7	Present your detailed study on any real world issue you think can be dealt with a sustainable solution w.r.t the problem, proposed solution, methodology / results / outcome and a case study, if available	**20**	**3**	**6**	**7.1.4**

----- The End -----

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End Semester Examinations MAY 2022

(2021-22)

27/5/22

Program: T.Y. Sem.VI and B. TECH. Sem. VIII **Duration: 03 Hrs.**

Course Code: OE-BTC-611/812 **Maximum Points: 100**

Course Name: HUMAN RESOURCES DEVELOPMENT AND ORGANIZATIONAL BEHAVIOR (HRDOB)

Semester: VI/VIII (Civil/Mechanical/Electrical)

Notes:

- Attempt ***any five*** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI
1	(a)Discuss: importance of effective organization, organization culture and explain how to make staff more effective at workplace.	10	1	1	6.1.1
	(b)Explain: McGregor's Theory 'X' and Theory 'Y' and assumptions about nature of people. How this will help leaders to develop an organization? Discuss.	10	1	1	6.1.1
2	(a)Discuss the Role of HR in an organization development. Also explain challenges of human resource development.	10	2	2	10.2.1
	(b)How HRD process helps people to acquire competencies in an organization? Explain.	10	2	3	10.2.1
3	(a)What is the need for organizational learning? Highlight its importance in organizational development.	10	1	2	12.1.2
	(b) Explain training and HRD process model and comment on effective training design in HR development process.	10	2	3	11.3.2
4	(a)What is employee counselling? Why it is required? State its importance with an example and state its benefits.	10	2	4	12.2.2
	(b)What is competency mapping? Explain its need in competency identification process.	10	2	4	12.1.1

(P.T.O.)

End Semester Examinations MAY 2022

(2021-22)

5	(a)Differentiate between career development and career management. Explain skills required in future career and job retention drivers.	10	2	4	12.1.1
	(b) What is diversity at workplace? How diversity matters? What kind of role HR can play in the process to manage it?	10	2	4	12.1.1
6	(a)Discuss HR ethics and its need at workplace.	10	2	2	8.1.1
	(b) What do you mean by organizational behavior? State Important characteristics of organizational behavior.	10	2	5	8.2.2
7	(a)Explain major contributing disciplines to the field of organizational behavior.	10	2	4	8.1.1
	(b)What is a work team? What makes workplace teams effective? Highlight issues of emotions and stress at workplace.	10	2	1	9.1.1

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(P.T.O.)

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Re-Examinations JULY 2022 (OE BTC611/812)

(2021-22) T.Y. B.Tech (Civil) Sem VI

Program: T.Y. and B. TECH **Duration: 03 Hrs.**
Course Code: OE BTC611/812 **Maximum Points: 100**
Course Name: HRDOB **Semester: VI/VIII**

Notes: Human Resource Development & Organisation Behaviour. 13/7/22.

- Attempt ***any five*** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly.**

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Q. No.	Questions	Points	CO	BL	PI
1	(a) Explain Critical roles and challenges of HRD.	10	1	2	1.3.1
	(b) Explain HRD Process Model.	10	1	4	2.1.2
2	(a) Discuss Mentoring for employee development.	10	2	2	1.3.1
	(b)What is stress management, employee wellness and health promotion? Explain.	10	2	4	2.1.2
3	(a) Discuss the role of HRD in Career Planning, management, and development.	10	2	4	1.3.1
	(b) Differentiate between Organizational Learning, and learning organizations.	10	2	5	2.2.3
4	(a) How HRD can be used for innovation and talent development and management? Explain.	10	2	2	2.1.2
	(b) Discuss ethical attitude, behavior and development into an organization.	10	3	4	2.3.1
5	(a) What is organizational Behavior? Explain.	10	3	2	
	(b) Discuss Emotions and Moods, Personality and Values in an organization.	10	2	4	3.1.6
6	(a) Explain: Foundations of Group Behavior such as Understanding Team work, Communication, leadership.	10	3	2	2.1.2
	(b) What do you mean by Organizational Culture? Explain.	10	3	3	3.4.2
7	(a) Discuss the role of Negotiations in conflict management.	10	3	4	2.3.1
	(b) How effective decision-making affects organization development? Explain.	10	3	4	2.3.1

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25/5/22

ESE-MAY 2022

Program: Civil Engineering T.Y. B Tech (Civil) Sem VI **Duration:3 hr.**

Course Code: MC-102 **Maximum Points: 100**

Course Name: Environmental Studies **Semester: VI**

Notes:

1. **Attempt any five out of seven questions**
2. **Illustrate answer with neat sketches wherever required.**
3. **Make suitable assumptions where necessary and state them clearly.**

Q.No.	Questions	Points	BL	CO	PO	PI Code
1.	Explain the Air & Water pollution with following points, 1. Definition 2. Pollutants 3. Sources 4. Effect on environment 5. Control measures	20	1	1,2,3	6,7	1.3.1
2	Explain the concept of ecology with following points, 1. Ecology & ecosystem 2. Biotic & abiotic factors 3. Food chain/food web/ tropic level 4. Energy pyramids 5. Lie-bigs law of the minimum & productivity	20	2	1,2	6,7	1.3.1
3	1. Explain hydrological & carbon cycle with diagram. 2. Explain aquatic and terrestrial ecosystem with examples.	20	2	1,2,3	6,7	1.3.1/ 2.1.3
4	Explain water treatment plant & sewage treatment plant with following points, 1. Function 2. Treatment units – operation and processes 3. Treatment flow sheet	20	2	1,2	6,7	1.3.1
5	Explain Noise & Soil Pollution with following points, 1. Definition 2. Causes or sources 3. Effect on environment 4. Control measures	20	2	1,2,3	6,7	1.3.1/ 2.1.3
6	Write a short note on: 1. Sustainable development 2. Solid waste Management	20	2	1,2	6,7	1.3.1/ 2.1.3
7	Write a short note on: 1. Radiation Pollution 2. EPA,1986	20	2	1,2,3	6,7	1.3.1/ 2.1.3

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T.Y. B. Tech (Civil) Sem VI 14/7/22

Re- Exam-July 2022

Program: Civil Engineering **Duration:3 hr.**

Course Code: MC-102 **Maximum Points: 100**

Course Name: Environmental Studies **Semester: VI**

Notes:

1. Attempt any five out of seven questions
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

Q.No.	Questions	Points	BL	CO	PO	PI Code
1.	Explain the Air & Water pollution with following points, 1. Definition 2. Pollutants 3. Sources 4. Effect on environment 5. Control measures	20	1	1,2,3	6,7	1.3.1
2	1. Explain the concept of ecology & Loss of Bio-Diversity 2. Convention on climate change	20	2	1,2	6,7	1.3.1
3	1. Explain Nitrogen & Sulphur cycle with diagram. 2. Explain EPA,1986.	20	2	1,2,3	6,7	1.3.1/ 2.1.3
4	1. What do you mean by GRIHA? Explain the function of GRIHA & its rating system. 2. Bio-Diversity act	20	2	1,2	6,7	1.3.1
5	Explain Noise & Thermal Pollution with following points, 1. Definition 2. Causes or sources 3. Effect on environment 4. Control measures	20	2	1,2,3	6,7	1.3.1/ 2.1.3
6	Write a short note on: 1. Sustainable development 2. Global Warming.	20	2	1,2	6,7	1.3.1/ 2.1.3
7	Write a short note on: 1. Radiation Pollution 2. Ozone Depletion	20	2	1,2,3	6,7	1.3.1/ 2.1.3

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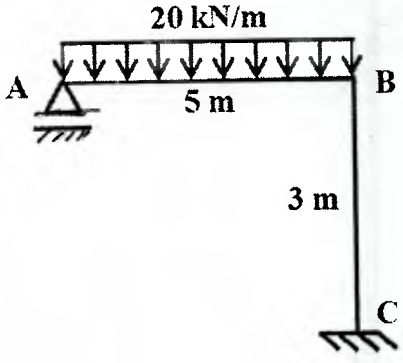
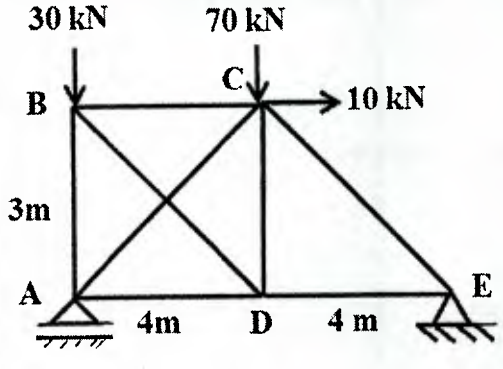
End Semester Examinations: May 2022

27/5/22

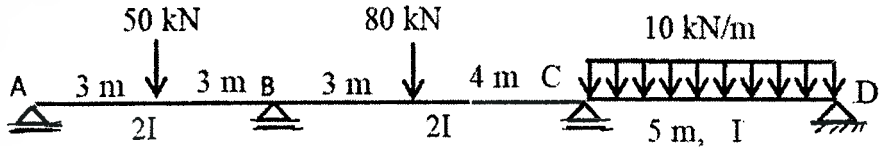
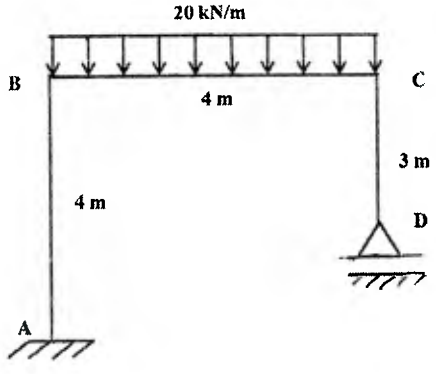
T.Y. B.Tech (Civil) Sem VI

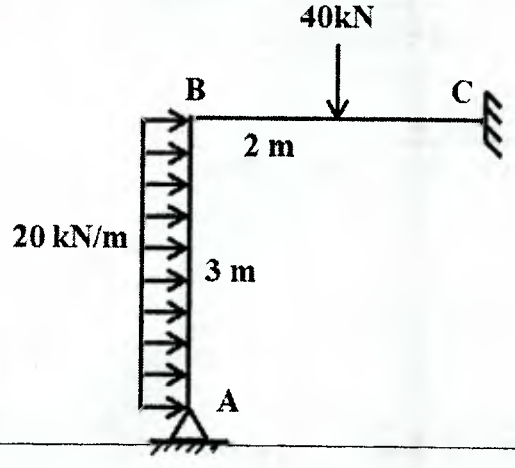
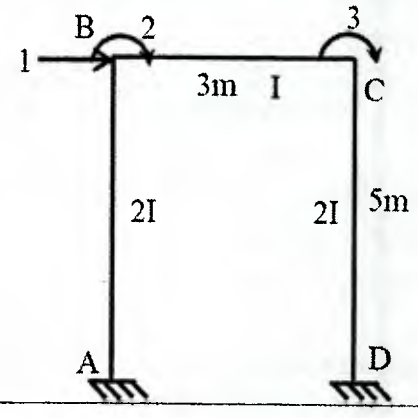
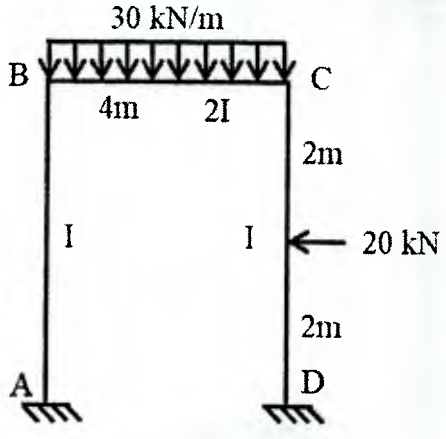
Program: B.Tech. in Civil Engineering — **Duration: 3 Hours**
Course Code: PE-BTC621 — **Maximum Points: 100**
Course Name: Analysis of Indeterminate Structures — **Semester: VI**

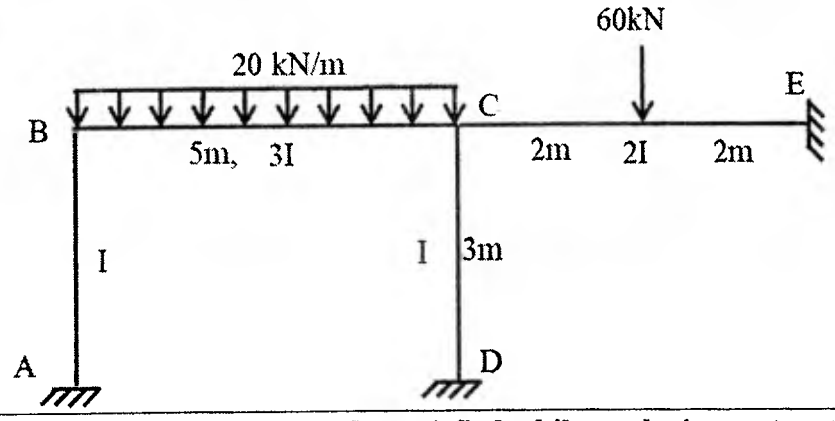
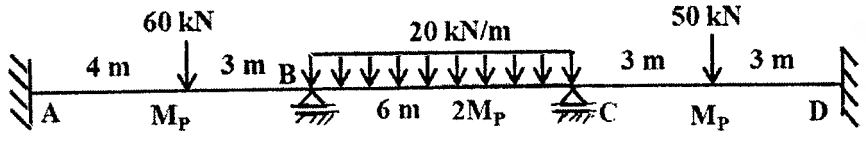
1. Attempt any FIVE questions out of SEVEN questions.
2. **Answers to all sub questions should be grouped together.**
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary and state the same clearly.

Q.No	Questions	Points	CO	BL	PI
Q1(a)	**Find the reaction at A in the frame shown in figure using flexibility method.**	08	1	3,4	1.3.1 2.1.3
					
Q1(b)	**Find the force in the redundant member AC of the truss loaded as shown in figure below by flexibility (compatibility) method. (Take force in member AC as the redundant force.) Assume AE to be same for all the members.**	12	1	3,4	1.3.1 2.1.2 2.1.3
					

End Semester Examinations: May 2022

Q2(a)	**Analyse the continuous beam shown in figure using three moment theorem and find the support moments at B and C.**	**12**	**1**	4	1.3.1 2.1.2
					
Q2(b)	**A two hinged parabolic arch of span 20 m and rise 4 m carries a concentrated load of 40 kN at a distance of 5 m from the left support. Determine the horizontal thrust in the arch. The moment of inertia (MI) of the section of the arch varies as $I = I_o \sec\Theta$, where I_o = MI of the section at the crown.**	**08**	**1**	3,4	1.1.1 1.3.1 2.4.1
Q3(a)	**Find the reaction at A in the frame shown in figure using the theorem of least work.**	**10**	**1**	**3,4**	**1.3.1 2.1.3**
					
Q3(b)	**Define flexibility coefficient f_{ij} and state the important properties of the flexibility matrix**	**05**	**1**	**3,4**	**1.3.1 2.1.3**
Q3(c)	**Define** **(i) Rotational bending stiffness of a member?** **(ii) Distribution Factor** **(iii) Load factor** **(iv) Shape factor** **(v) Plastic Modulus of a given section**	**05**	**2**	**1,2**	**1.3.1**

Q4(a)	**Find the unknown displacements in the frame shown in the figure below by slope deflection method.**	**10**	**2**	3,4	1.3.1 2.1.2
					
Q4(b)	**Calculate the stiffness coefficients for the frame shown in figure w.r. to the coordinates indicated in the figure.**	**10**	**2**	**3,4**	**1.3.1 2.1.2 2.1.3**
					
Q5	**Analyse the the rigid jointed frame loaded as shown in the figure below by moment distribution method.**	**20**	**2**	**3,4**	**1.3.1 2.1.2**
					

Q6(a)	**Using stiffness method, find the unknown displacements in the rigid jointed frame loaded as shown in the figure below.**	**14**	**2**	**3,4**	**1.3.1 2.1.2 2.1.3**
					
Q6(b)	**What are the conditions to be satisfied while analyzing a structure using** **(i) Elastic analysis** **(ii) Plastic analysis**	**06**	**1,2,3**	**3,4**	**1.3.1 2.1.2**
Q7(a)	**Find the shape factor for the unsymmetrical I section with the following data.** **Top flange - width = 300 mm, thickness = 30 mm** **Bottom flange - width = 200 mm, thickness = 20 mm** **Depth of web = 250 mm, thickness of web = 25 mm.**	**10**	**3**	**3,4**	**1.3.1 2.1.2**
Q7(b)	**A continuous beam is subjected to working loads as shown in figure below. If M_P = 75 kN-m, calculate the (true) load factor for the beam.**	**10**	**3**	**3,4**	**1.3.1 2.1.2**
					

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Munshi Nagar, Andheri (W) Mumbai – 400058

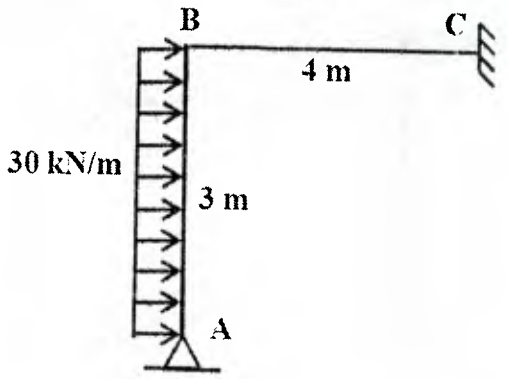
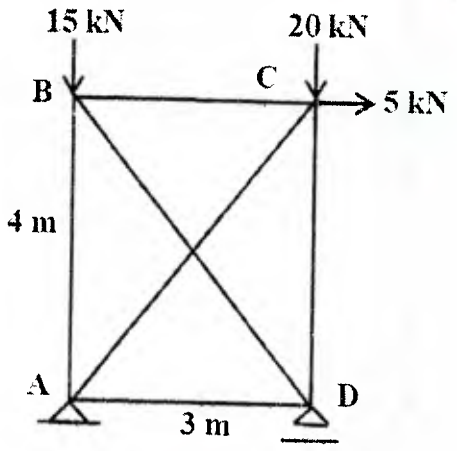
Re-Examinations: July 2022

T.Y. B.Tech Civil Sem VI 15/7/22.

Program: B.Tech. in Civil Engineering
Course Code: PE-BTC621
Course Name: Analysis of Indeterminate Structures

Duration: 3 Hours
Maximum Points: 100
Semester: VI

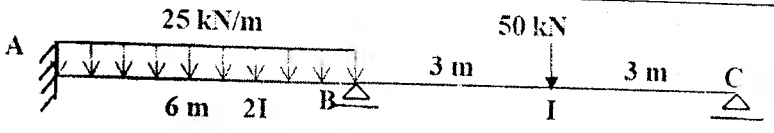
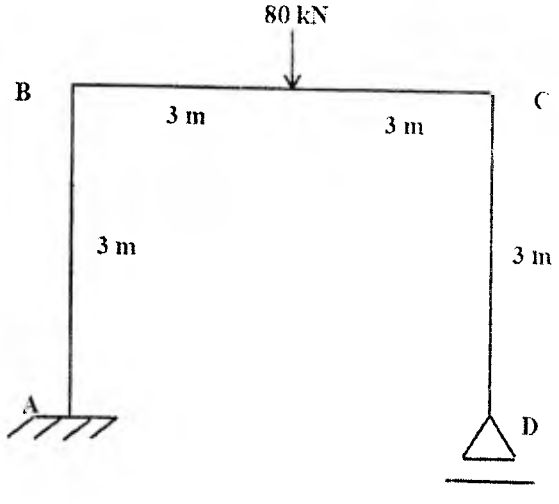
1. Attempt any FIVE questions out of SEVEN questions.
2. **Answers to all sub questions should be grouped together.**
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary and state the same clearly.

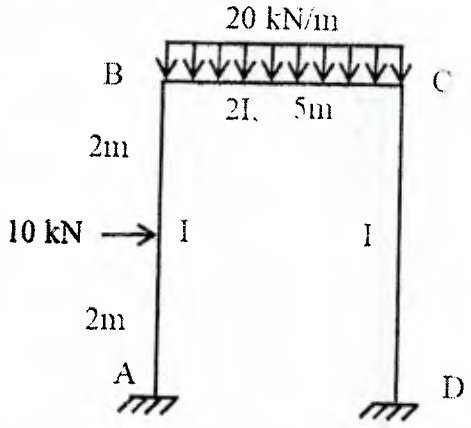
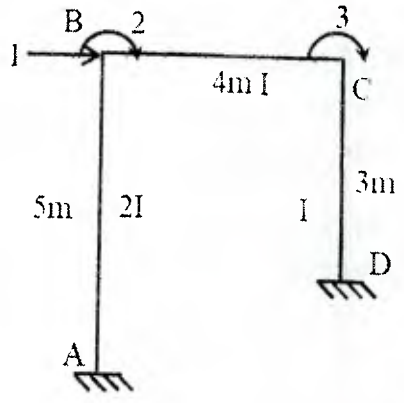
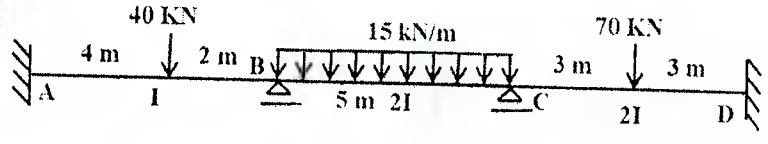
Q.No	Questions	Points	CO	BL	PI
Q1(a)	**Find the reactions at A in the frame shown in figure using flexibility method.**	10	1	3,4	1.3.1 2.1.3
					
Q1(b)	**Find the force in the redundant member AC of the truss loaded as shown in figure below by flexibility (compatibility) method. (Take force in member AC as the redundant force.) Assume AE to be same for all the members.**	10	1	3,4	1.3.1 2.1.2 2.1.3
					

SARDAR PATEL COLLEGE OF ENGINEERING

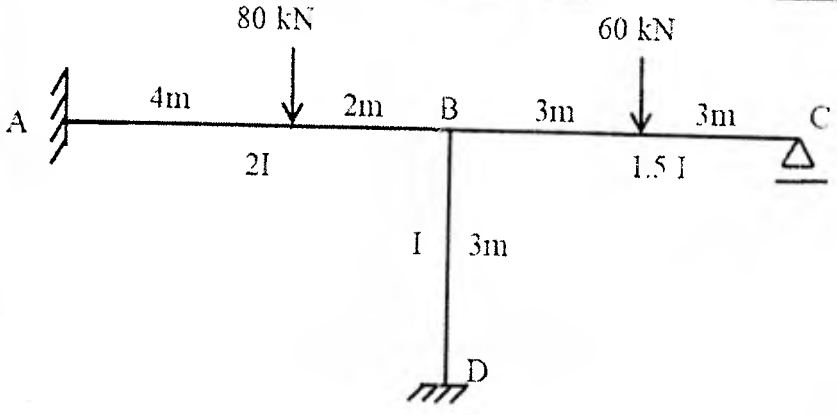
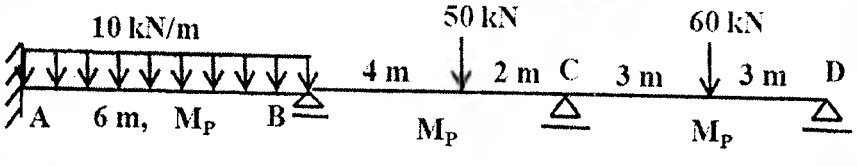
(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai - 400058

Re-Examinations: July 2022

Q2(a)	**Analyse the continuous beam shown in figure using three moment theorem and find the support moments at A and B.**	12	1	4	1.3.1 2.1.2
					
Q2(b)	**A two hinged parabolic arch of span 30 m and rise 5 m carries a concentrated load of 70 kN at a distance of 10 m from the right support. Determine the horizontal thrust in the arch. The moment of inertia (MI) of the section of the arch varies as $I = I_o \sec\theta$, where I_o = MI of the section at the crown.**	08	1	3,4	1.1.1 1.3.1 2.4.1
Q3(a)	**Find the reaction at D in the frame shown in figure using the theorem of least work.**	10	1	3,4	1.3.1 2.1.3
					
Q3(b)	**Define stiffness coefficient k_{ij} and state the important properties of the stiffness matrix.**	05	2	3,4	1.3.1 2.1.3
Q3(c)	**State if the following method is a force method or displacement method** **(i) Moment distribution method** **(ii) Stiffness method** **(iii) Method of least work** **(iv) Flexibility method** **(v) Slope deflection method**	05	1, 2	1,2	1.3.1

Q4	**Find the unknown displacements in the frame shown in the figure below by slope deflection method.**	**20**	**2**	3,4	1.3.1 2.1.2
					
Q5(a)	**Calculate the stiffness coefficients for the frame shown in figure w.r. to the coordinates indicated in the figure.**	**10**	**2**	**3,4**	**1.3.1 2.1.2 2.1.3**
					
Q5(b)	**Analyse the continuous beam loaded as shown in the figure below by moment distribution method.**	**10**	**2**	**3,4**	**1.3.1 2.1.2**
					

Re-Examinations: July 2022

Q6(a)	**Using stiffness method, find the unknown displacements and member end moments in the rigid jointed frame loaded as shown in the figure below.**	14	2	3,4	1.3.1 2.1.2 2.1.3
					
Q6(b)	**What are the advantages of plastic analysis over elastic analysis? Also mention the limitations of plastic analysis.**	06	1,2,3	3,4	1.3.1 2.1.2
Q7(a)	**Find the shape factor for the unsymmetrical I section with the following data.** **Top flange - width = 250 mm, thickness = 30 mm** **Bottom flange - width = 400 mm, thickness = 40 mm** **Depth of web = 300 mm, thickness of web = 30 mm.**	10	3	3,4	1.3.1 2.1.2
Q7(b)	**A continuous beam is subjected to working loads as shown in figure below. If M_P = 100 kN-m, calculate the (true) load factor for the beam.**	10	3	3,4	1.3.1 2.1.2
					

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester May 2022 Examinations

27/5/22

Program: B. Tech. Civil Engineering **Duration: 3hrs.**

Course Code: PE-BTC612 **Maximum Points: 100**

Course Name: GIS Science & Applications **Semester: VI**

Geographic information Systems Science & Applications

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 and 5 is COMPULSORY.**
   Data is given in the folder **'PE_BTC622 End Sem May 22'** on the desktop.
   Save all the outputs in the **'Output'** folder.
   Zip the Output folder and upload it on the classroom PE-BTC622 End Sem May 22.
3. **From the remaining Five Questions Solve ANY THREE.**
4. **Assume suitable data, wherever necessary and State it clearly.**
5. Write **answer to each question on a new page.**
6. Answers to be accompanied with **appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart** wherever necessary or required.

Q.No.	Questions	Points	CO	BL	PI
1.					
	1. Define: (2 marks each) i. Web GIS ii. Geo Spatial Analysis iii. Data Structures iv. Cartography v. Map projections 2. Differentiate between: (2 marks each) i. Horizontal and Vertical datum. ii. Internet and Web GIS. iii. Spatial and non-spatial data sets iv. Spatial and non-spatial data sources v. Relational database and Network database	20	1,2,3,4	1,2	5.1.1
2.A	Explain with appropriate examples how Geographic Information system (GIS) is different than any other information system.	5	1,2	1,2	5.1.2
2.B	Explain the elements of basic map design.(3) Differentiate between qualitative and quantitative maps. (3) State the characteristics and advantages of Web GIS. (6) Give various applications of WebGIS. (3)	15	3,4	3,4	5.1.3
3.A	Explain with a neat sketch the working of a remote sensing (RS) system and its applications. (5) Explain how the information extracted from a RS can be a data source for spatial analysis in GIS with an appropriate example. (5)	10	3,4	3,4	5.1.2
3.B	Differentiate between raster and vector data structure. (6) For a raster model, state the rules needed to assign value to a cell. (4)	10			5.1.2

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.A</td><td>Explain how and which type of data can be extracted from a aerial photogrammetry. (5)
Explain with a neat sketch how the location of any spatial feature is obtained by using global positioning system (GPS). (5)</td><td>10</td><td>3,4</td><td>4</td><td>5.1.3</td></tr>
<tr><td>4.B</td><td>Describe the 'Quad tree' representation of a raster data structure.(6)
Give the file formats available for raster data spatial data. (4)</td><td>10</td><td>3</td><td>1,2</td><td>5.1.3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5.A</td><td>Data 5A folder consists of "Hawaii_Counties" vector data. Open it in QGIS and answer the following questions: (write on the answersheet)
1. The shapefile is projected on _____ Coordinate reference system.
2. The attribute data for the shapefile consists of _____
3. The smallest polygon is represented by the county name _____
4. The geoid of the biggest county (polygon) is _____
5. Which tool did you use to get the above information _____</td><td>5</td><td>5</td><td>5,6</td><td>5.1.4</td></tr>
<tr><td>5.B</td><td>Data 5B folder consists of an image "Mysore_city".
The ground control points (GCP) to be georeferenced on the image are marked in red and numbered from 1 to 15. The coordinates of the GCP are as given here:
<table>
<tr><th>GCP</th><th>Longitude</th><th>Latitude</th></tr>
<tr><td>1</td><td>76.648849050</td><td>12.267386148</td></tr>
<tr><td>2</td><td>76.633172162</td><td>12.265418473</td></tr>
<tr><td>3</td><td>76.644052212</td><td>12.287837785</td></tr>
<tr><td>4</td><td>76.622385724</td><td>12.290051312</td></tr>
<tr><td>5</td><td>76.616882196</td><td>12.302348407</td></tr>
<tr><td>6</td><td>76.627669375</td><td>12.316490605</td></tr>
<tr><td>7</td><td>76.660330959</td><td>12.307149110</td></tr>
<tr><td>8</td><td>76.692116262</td><td>12.305623314</td></tr>
<tr><td>9</td><td>76.674680285</td><td>12.323340105</td></tr>
<tr><td>10</td><td>76.694648762</td><td>12.332985015</td></tr>
<tr><td>11</td><td>76.652195657</td><td>12.329953224</td></tr>
<tr><td>12</td><td>76.666959208</td><td>12.347802326</td></tr>
<tr><td>13</td><td>76.630331570</td><td>12.345493168</td></tr>
<tr><td>14</td><td>76.618523934</td><td>12.336633462</td></tr>
<tr><td>15</td><td>76.611912984</td><td>12.328705243</td></tr>
</table>
Georeference the given image in QGIS with **any of the 6 GCP** coordinates (default transformation parameters) and save the georeferenced image (take Screenshot and save it in paint as "georef_mysore") in the Output folder.</td><td>5</td><td>5</td><td>5,6</td><td>5.1.4</td></tr>
<tr><td>5.C</td><td>Data 5C folder consists of 'contour' layer of a region. Open the contour layer in QGIS and do the following:
i. Classify the contours - Graduated
ii. Change the colour ramp of the contours – Spectral</td><td>5</td><td>5</td><td>5,6</td><td>5.1.4</td></tr>
</table>

	iii. Label the contours – single label – elevation Save / Export the image (with all the above changes) as "contour_modified" to the Output folder.				
5.D	Data folder 5C consists of tacheometric survey data in excel sheet. Convert the data in '.csv' format and prepare a shapefile from the csv data in QGIS. Save the shapefile in the Output folder as "tacheo_points".	**5**	**5**	**5,6**	**5.1.4**
6.A	State and explain the distortions that occur in the map projections. (4) differentiate between cylindrical and conical projections. (6)	**10**	**2,3**	**3,4**	**5.1.2**
6.B	Explain with an appropriate example, the arc, node and polygon topology for representing vector data.	**10**	**2,3**	**3,4**	
7.A	Write a note on i. Topographical maps of India. (5) ii. Earth Ellipsoids. (5)	**10**	**3**	**1,2**	**5.1.2**
7.B	Explain the term 'Topology building'.(2) Explain with proper example any two of the following topology building: (8) 1. Connectivity 2. Contiguity 3. Containment	**10**	**3**	**1,2**	**5.1.2**

----- The End -----

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SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester July 2022 Re-Examination

T.Y. B. Tech (Civil) Sem VI

Program: B. Tech. Civil Engineering **Duration: 3hrs.**

Course Code: PE-BTC622 **Maximum Points: 100**

Course Name: GIS Science & Applications **Semester: VI**

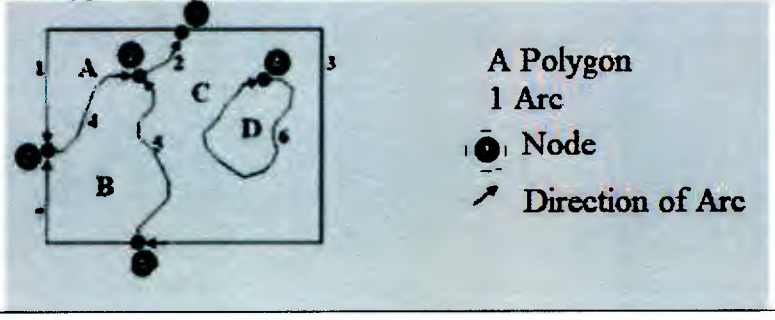
Geographic Information System Science & Appln. 15/7/22

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of 20 points.
2. **QUESTION 1 and 5 is COMPULSORY.**
   Data is given in the folder **'PE_BTC622 End Sem May 22'** on the desktop.
   Save all the outputs in the **'Output'** folder.
   Zip the Output folder and upload it on the classroom PE-BTC622 End Sem May 22.
3. **From the remaining Five Questions Solve ANY THREE.**
4. **Assume suitable data, wherever necessary and State it clearly.**
5. Write **answer to each question on a new page.**
6. Answers to be accompanied with **appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart** wherever necessary or required.

Q.No.	Questions	Points	CO	BL	PI
1.					
	1. Define: (2 marks each) i. GIS ii. Remote sensing system iii. Global positioning system iv. Spatial analysis v. Cartography 2. Differentiate between: (2 marks each) i. Raster & Vector Model ii. CAD & GIS iii. Spectral and Spatial resolution iv. Network and relational database structure	20	1,2,3,4	1,2	5.1.1
2.A	State the advantages of GIS (3). Explain the trend of GIS market (2).	5	1,2	1,2	5.1.2
2.B	Explain the importance of geographic projections in any GIS (4). State and explain different types of projections available in a GIS (6). Explain how maps are the base for any spatial work in a GIS (2). Explain the difference between analog and digital maps (3).	15	3,4	3,4	5.1.3
3.A	Explain different types of remote sensing systems (2). Distinguish them (3). Explain how GPS data can be used for spatial analysis, with a proper example (7).	10	3,4	3,4	5.1.2
3.B	Give different file formats of raster data structure (4). Explain run length encoding compression technique (6).	10			5.1.2

End Semester July 2022 Re-Examination

4.A	Give different file formats for vector data structure (4). Explain with an example how a vector data is stored (6).	**10**	**3,4**	**4**	**5.1.3**
4.B	State various spatial analysis operations (4). Explain any two spatial operations with a proper example (6).	**10**	**3**	**1,2**	**5.1.3**
5.A	Data 5A folder consists of "PubSchools" vector data. Open it in QGIS and answer the following questions: (write on the answersheet) 1. The shapefile is projected on _____ Coordinate reference system. (2) 2. The attribute data for the shapefile consists of filed 'District'. Name 2 to 3 Districts. (2) 3. Which tool did you use to get the above information. (1)	**5**	**5**	**5,6**	**5.1.4**
5.B	For the toposheet given in 5B folder, georeference the **four corners of the toposheet**. The coordinates are given in the toposheet itself. Take the screen shot (press PrtSc on the keyboard and paste it in paint) of the geo referenced image (complete QGIS screen), save it as 'reg no_Q.5B' and upload on the classroom.	**5**	**5**	**5,6**	**5.1.4**
5.C	Data 5C folder consists of Vector layers. Open all the layers in QGIS and prepare a map layout showing north arrow, scale and coordinate frame. Save the Map layout as pdf 'reg no_Q.5C' and upload on the classroom.	**10**	**5**	**5,6**	**5.1.4**
6	State the three types of topology building for vector data structure in GIS with proper example (10). Represent the given vector data structure in (10): i) Left-right topology ii) Polygon arc topology 	**20**	**2,3**	**3,4**	**5.1.2**
7	Write a note on: (4 points each) i. Geodetic datum ii. Advantages of WebGIS iii. World Geodetic System 1984 iv. Components of a GIS system v. GIS as a decision supporting system	**20**	**3**	**1,2**	**5.1.2**

----- The End -----

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SARDAR PATEL COLLEGE OF ENGINEERING

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END SEMESTER EXAM -2022

Program: Civil Engineering T.Y. B.Tech (Civil) Sem VI 27/5/22 **Duration:3 hr.**

Course Code: PE-BTC 651 **Maximum Points: 100**

Course Name: SOLID & HAZARDOUS WASTE MANAGEMENT **Semester: VI**

Notes:

1. **Q.1 is compulsory & attempt any four from remaining six**
2. **Illustrate answer with neat sketches wherever required.**
3. **Make suitable assumptions where necessary and state them clearly.**

Q.No.	Questions	Points	BL	CO	PO	PI Code
1	Attempt any four: 1. Bio-medical waste 2. Identification of Hazardous waste 3. Stationary Container Systems (SCS) 4. Types of Land fill method 5. Transportation of solid waste 6. Sample label of containers on hazardous waste	20	1	2,3	1,6,7	1.3.1
1.	1. Define: Solid waste & Solid waste management. Explain the various sources & types of solid wastes. 2. Explain the solid waste characteristics.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
2	1. Explain collection services for solid waste in a city with their diagrams, suitability, advantages & disadvantages. 2. Design a solid waste collection system to service area having 1000 dwellings. Assume that 2 Person collector crew will be used, -Avg. no. of residents per service=3.5 -SW generation per capita= 2.0lb/capita/day -Density of solid wastes at containers= 200lb/yd3 -Containers per service= two 32 gal containers -Types of service = 50% rear of house, 50% alley system -Collection frequency = 1/week -Collection vehicle= rear loaded compactor -Compaction ratio= 2 &Round trip haul distance =15mi -Length of workday= 8h & Trips per day= 2 -Off route factor = 0.15 -Constants for estimating haul time=a =0.016h/trip, b = 0.018mi/h & At site time /trip= 0.10h/trip	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
3	1. What are the objectives of processing techniques? Explain the various types of volume reduction for solid waste at processing stations in solid waste management. 2. Explain briefly functional elements of solid waste management system.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3

4	Write a short note on: 1. Costs in solid waste collection system 2. Transfer station 3. Onsite handling & Onsite storage for solid waste 4. Public health effects in municipal solid waste management.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
5	Explain the following methods of treatment & disposal of solid waste in detail, 1. Sanitary Landfill 2. Incineration 3. Open dumping 4. Composting 5. Pyrolysis	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
6	1. Explain treatment options available for hazardous waste in India. 2. Explain the following operators requirement while handling hazardous waste - Storage area - Container Management - Hazardous waste accumulation	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
7	1. Explain the responsibilities of occupier as per hazardous waste management rules, 2016. 2. Explain any four characteristics of hazardous waste as per hazardous waste management rules, 2016.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3

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SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

T.Y. B.Tech (Civil) Sem VI

Re-Exam July -2022

Program: Civil Engineering **Duration:3 hr.**

Course Code: PE-BTC 651 **Maximum Points: 100**

Course Name: SOLID & HAZARDOUS WASTE MANAGEMENT **Semester: VI**

15/7/22

Notes:

1. **Q.1 is compulsory & attempt any four from remaining six**
2. **Illustrate answer with neat sketches wherever required.**
3. **Make suitable assumptions where necessary and state them clearly.**

Q.No.	Questions	Points	BL	CO	PO	PI Code
1	1. Define solid waste and solid waste management. 2. List the equipment's used in collection of solid waste. 3. Transfer Station. 4. List the factors affecting composting process of solid waste 5. List the sources of generation of hazardous waste.	20	1	2,3	1,6,7	1.3.1
2	1. Explain the major provisions in Municipal Solid Waste Management Rules 2016. 2. Design a solid waste collection system to service area having 1000 dwellings. Assume that 2 Person collector crew will be used, -Avg. no. of residents per service=3.5 -SW generation per capita= 2.0lb/capita/day -Density of solid wastes at containers= 200lb/yd3 -Containers per service= two 32 gal containers -Types of service = 50% rear of house, 50% alley system -Collection frequency = 1/week -Collection vehicle= rear loaded compactor -Compaction ratio= 2 &Round trip haul distance =15mi -Length of workday= 8h & Trips per day= 2 -Off route factor = 0.15 -Constants for estimating haul time=a =0.016h/trip, b = 0.018mi/h & At site time /trip= 0.10h/trip	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
3	1. Explain the health safety measures to be adopted during handling and processing Solid Waste 2. Explain briefly functional elements of solid waste management system.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
4	Write a short note on: 1. Types of wastes 2. Types of collection services 3. Public health effects in municipal solid waste management.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3

	4. Chemical characteristics of solid waste.					
5	1. Explain the methods of treatment & disposal of solid waste in detail. 2. Enlist Various Methods of land filling and explain any one of them. Give the advantages and disadvantages of land filling.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
6	1. Explain importance of solid waste management in making any city as smart city. 2. Explain the Handlers/operators requirement while handling hazardous waste	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3
7	1. State the status of recycling of solid waste in India 2. Explain any four characteristics of hazardous waste as per hazardous waste management rules, 2016.	20	2	1,2,3	1,6,7	1.3.1/ 2.1.3

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination – May 2022

T.Y. B.Tech (Civil) Sem VI 20/5/22

Program: B. Tech. Civil | **Duration: 3 Hour**

Course Code: PEC-BTC726 (Elective) | **Maximum Points: 100**

Course Name: Traffic Engineering and Control | **Semester: VI**

Notes:

(i) Question 1 is compulsory
(ii) Solve any four out of remaining six questions
(iii) Assume suitable data if required

Q.No.	Questions	Points	CO	BL	PI
Q.1.					
(a)	Define spot speed study. Discuss different methods available for conducting spot speed study.	10	1	2	1.2.1
(b)	Spot speed study were carried out at a stretch of highway. The consolidated data is given bellow in Table 1. Determine graphically the following; (i) What will be 98th percentile speed, 85th percentile speed and 15th percentile speed? (ii) Mean mode median variance and standard deviation.	10	2	3	2.2.3
Q.2.					
(a)	Enlist the different methods available for conducting traffic survey for estimation of Running speed and journey speed. Discuss field procedure for conducting traffic survey by moving observer method. How will you record the data collected.	08	1	3	4.1.1
(b)	ABCD is a street running North to South consist of three adjacent section. The length of each section shown in the table 2. below; The details of observation of moving observer team is shown in the Table 3 below. Calculate the flow and running speed in each section in both direction and overall journey speed in each direction.	12	1	5	2.2.4
Q.3.					
(a)	the spot speed study at particular location are normally distributed with mean of 51.7 km/hr and standard deviation 8.3 km/hr. what is the probability that; (i) Speed exceed 65 km/hr. (ii) Speed lie between 45 km/hr and 65 km/hr.	10	2	5	2.2.3

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	(iii) What will be 98th percentile speed, 85th percentile speed and 15th percentile speed?				
(b)	The 30 minute traffic count on cross road 1 and 2 during peak hour are observed as 280 vehicles per lane and 250 vehicles per lane respectively approaching the intersection. In the direction of heavy traffic flow, if the Amber time required is 3 second and 2 second for two roads based on approach speed. Design a signals by trial circle method. Also, draw a Phase diagram and tabulate the results. (Assume headway of 3 second during green phase)	10	2	5	2.2.4
Q.4.	write short notes on				
(a)	z – Test and Student – t Test	5	2	1	1.2.1
(b)	One Tail and Two Tail Test.	5	2	1	1.2.1
(c)	The spot speed of 24 vehicles at particular location of highway is shown in Table 4 below; the population mean spot speed at the location is 45 km/hr. verify the spot speed is higher or lower than population mean speed.	10	2	4	2.2.4
Q.5.					
(a)	What are the different types of traffic signs? Mention at least two traffic signs of each type.	5	2	2	1.2.1
(b)	Explain the different types of road markings.	5	1	1	1.2.1
	A single lane road of 10 km long is to be converted to concrete road at the cost of 125 lakhs per km including all the improvement. The vehicle operating cost of existing road is 7 Rs.per vehicle per km and vehicle operating cost of proposed concrete road will be 5 Rs. per vehicle per km. the average traffic expected on the road is 3500 vehicle per day for design period of 25 years. The maintenance cost of existing single lane road is 25,000 Rs. per km per annum and maintenance cost of proposed concrete road will be 30,000 Rs. per km per annum. If the rate of interest is 12 percent. Determine the project is worth or not.	10			
Q.6.					
(a)	Discuss average Growth factor method for trip distribution.	05	2	4	2.1.2
(b)	Discuss Home based and non Home Based trip	05			
(b)	The traffic pattern in three zones during O – D study is shown in O – D matrix (Table 6) . Determine the future trip generated based on present data by average growth factor method.	10	2	5	2.2.4
Q.7.					
(a)	Derive the fundamental equation of traffic flow (Traffic Volume). Also, discuss all the terms required for the derivation of fundamental equation of traffic flow.	08	1	2	1.2.1

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(b)	Discuss Space mean speed and time mean speed	06	1	2	1.2.1
(c)	Define the term (i) Precision and (ii) Confidence level with example	06	1	2	1.2.1

Table 1. Q. 1. (b)

Speed range	**0-10**	**10-20**	**20-30**	30-40	40-50	**50-60**	**60-70**	**70-80**	**80-90**	**90-100**
Frequency	**12**	**18**	**68**	**90**	203	**255**	**120**	**42**	**30**	**10**

Table 2. Q.2. (b)

Section	Length (m)
AB	500 m
B	Intersection
BC	600 m
C	Intersection
CD	450

Table 3. Q.2.(b)

South Bound Traffic				
Section	**Time (second)**	**Vehicles counted**		
		Opposite direction	**Vehicles Overtaking test car**	**Vehicles Overtaken by test car**
AB	152	25	4	3
B	15	--	--	--
BC	172	31	2	2
C	10	--	---	--
CD	138	28	3	4
North Bound Traffic				
DC	132	50	2	1
C	12	--	--	--
CB	160	55	3	4
B	18	--	--	--
BA	145	45	1	1

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Table 4. Q.4.(c)

24	27	39	31	55	27	36	24
41	45	49	43	43	45	46	45
31	38	38	42	39	48	55	54

Table 5 (Q. 6)

Origin/distination	1	2	3
1	60	100	200
2	100	20	300
3	200	300	20

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T.Y. B. Tech (Civil) Sem VI

RE- EXAMINATION JULY 2022

Program:T. Y. B. Tech. Civil | **Duration: 3 hours**

Course Code: PE – BTC – 663 | **Maximum Points: 100**

Course Name: Traffic Engineering & Control (Elective) | **Semester: VI**

19/7/22

(i) Question 1 is compulsory
(ii) Solve any four out of remaining six questions
(iii) Assume suitable data if required

Q.No.	Questions	Points	CO	Module NO.
Q.1.				
(a)	Discuss normal density function and standard normal density function of normal probability distribution curve.	06	2	1
(b)	Discuss Importance of statistics in traffic planning	06	2	1
(c)	At uncontrolled T Junction past experience indicates that probability of vehicles arrive on side of road during 15 second interval and turning right in main road is 1/4. Find the probability that in a period of 1 minute there will be 0, 1, 2, 3 and 4 vehicles arriving and turning right.	08	2	1
Q.2.				
(a)	Origin – Destination Study	05	1	1
(b)	Least Square Method for Regression analysis	05	2	2
(c)	The speed and concentration of vehicle in a traffic stream were observed' the data were recorded and shown in Table 1. Find the regression equation using least cost method for (i) Determining speed from concentration (ii) Determining concentration from speed.	10	2	2
Q.3.				
(a)	Discuss PCU. Also, tabulate PCU of different vehicles on Rural Roads (use IRC guideline).	06	1	2
(b)	Discuss the term Vehicle Occupancy Survey	06	1	2
(c)	Discuss Rotary Intersection. Also state its advantages and disadvantages	08	1	4
Q.4.				
(a)	Discuss At Grade Intersection and Grade separate intersection	05	1	5
(b)	Discuss the advantage and disadvantage of Traffic signals.	05	1	4

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RE- EXAMINATION JULY 2022

(c)	The Trip pattern in four zones during O –D study is shown in O-D matrix, Table 2. Determine future trip generated by (i) Uniform Growth Factor Method and (ii) Average Factor Method	**10**	**1**	**1**
Q.5.				
(a)	Discuss Guideline for Signal Installation	**05**	**1**	**4**
(b)	Explain the different types of road markings.	**07**	**1**	**6**
(c)	The 30 minute traffic count on cross road 1 and 2 during peak hour are observed as 280 vehicles per lane and 250 vehicles per lane respectively approaching the intersection. In the direction of heavy traffic flow, if the Amber time required is 3 second and 2 second for two roads based on approach speed. Design a signals by trial circle method. Also, draw a Phase diagram and tabulate the results. (Assume headway of 3 second during green phase).	**08**	**1**	**6**
Q.6.				
(a)	Explain the balanced and unbalanced transportation problem with an example	**06**	**1**	**3**
(b)	Discuss Home Interview Method Method for O- D study.	**06**	**1**	**1**
(c)	Enlist the different methods available for conducting traffic survey for estimation of Running speed and journey speed. Discuss field procedure for conducting traffic survey by moving observer method. How will you record the data collected.	**08**	**2**	**1**
Q.7.				
(a)	Write short notes on (i) North west corner method, (ii) Least cost method	**08**	**1**	**3**
(b)	A company has three plants A, B and C which supply two warehouses D, E, F and G. monthly plan capacity are 1500, 2500, 500 units respectively. Monthly warehouse requirements are 500, 1500, 1500, 1000 units respectively. Unit transportation costs are given in table 3. Obtain initial feasible solution by (i) N- W Corner Method. (ii) Least Cost Method	**12**	**1**	**3**

Table 1.

Concentration Vech/km	5	10	15	20	25	30	35	40	45	50
Speed Km/hr.	72	68	61	52	47	39	32	27	20	13

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Table 2.

O/D	1	2	3	4
1	75	160	225	300
2	200	125	300	175
3	170	260	75	200
4	110	300	120	140

Q.7. Table 3

	D	E	F	G	Supply
A	5	8	6	6	1500
B	4	7	7	6	2500
C	8	4	6	6	500
Demand	500	1500	1500	1000	

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END Sem Exam –June 2022

1/6/22

T.Y. B. Tech (Civil) Sem VI

1/6/22

Program: Civil Engineering **Duration:3 hrs**

Course Code: PC-BTC604 **Maximum Points: 100**

Course Name: Design of RCC Elements **Semester: VI**

Notes:

1) Attempt any five questions.
2) Draw reinforcement details wherever necessary.
3) Use of IS 456:2000 is permitted.

Q.No.		Questions	Points	CO	BL	PI
Q1	a)	What do you mean by Limit State.State and explain the assumptions made in LIMIT State of collapse(Flexure).	05	1	2	2.3.2
	b)	Derive design stress block parameters for singly RC sections for LSM of design subjected to flexure.	05	1	1,2	1.2.1, 1.3.1
	c)	When is it required to design a doubly reinforced beam?	05	1	2	1.2.1, 1.3.1
	d)	What are the functions served by longitudinal and transverse reinforcement in case of columns.	05	1	2	1.2.1, 1.3.1
Q2	a)	RC section 250mmx650mm depth overall and reinforced with 4-25mm dia is used as simply supported beam over an effective span of 5m. Determine the maximum udl beam can carry safely.Use M 30 and Fe-415	08	1	3	2.1.3
	b)	Design RC beam of size 300x500 mm and span 5m subjected to service udl of 100kN/m .Use M-35 and Fe 415	12	1,2	6	2.4.1
Q3	a)	An isolated TEE beam section has an effective depth of 750mm ,effective flange width of 1200mm ,rib width of 300mm ,slab depth of 125mm .Design the beam to carry ultimate moment of 750kN-m Use M-30and Fe-415.	10	1	3	2.3.1
	b)	Design one way slab panel of room of RCC residential building having dimensions 2.5mx 6m. Give appropriate checks. Use M30and Fe 415.Draw reinforcement details	10	1,2	6	2.4.1
Q4	a)	Design a RC slab for an interior panel of a balcony of a residential building. The size of panel is 3mx 5m.Assume live load of 3kN/m2.,Draw bottom reinforcement plan and section	20	1,2	6	2.1.3

		along long span. Give appropriate checks. Use M35 and Fe 415				
Q5	a)	What are the functions of distribution steel in one way slab?	05	1	2	1.4.1
	b)	Design short helically reinforced column to resist service load of 1500kN.Use M35 and Fe500.Draw reinforcement details	15	1,2	6	3.1.6
Q6	a)	A column of dimension 500mmx500mm is subjected to axial load of 1600kN.Design isolated footing for column assuming SBC as 225kN/m2.Use M30 and Fe 415.	15	1,2	6	3.1.6
	b)	Calculate load carrying capacity of column of size 500mmx600mm comprising of 8-25mm dia. Use M-30 and Fe-500.	05	1	2	1.3.1
Q7	a)	A rectangular beam 300mm x500mm effective depth is reinforced with 6 bars of 20mm dia in tension zone .The beam is subjected to udl of 60kN/m over span of 5m.Design shear reinforcement. Use M30 and Fe415	10	1,2	6	3.1.6
	b)	Determine ultimate load carrying capacity of column (300 x500)mm subjected to uniaxial bending reinforced with 4 bars of 20mm dia(each in one corner).Take xu /D= 1.1 .Assume fsc=0.87fy and fc=0.446fck.Assume C1= 0.385 and C2= 0.443.Use M30 and Fe 415.Also find eccentricity of the load.	10	1,2	4	2.4.1

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Re Exam –July 2022

T.Y. B.Tech Civil Sem VI

Program: **Civil Engineering** **Duration:3 hrs**

Course Code: PC-BTC604 **Maximum Points: 100**

Course Name: Design of RCC Elements **Semester: VI**

2017/22

Notes:

1) Attempt any five questions.
2) Draw reinforcement details wherever necessary.
3) Use of IS 456:2000 is permitted.

Q.No.		Questions	Points	CO	BL	PI
Q1	a)	What do you mean by Limit State.State and explain the assumptions made in LIMIT State of collapse(Flexure).	05	1	2	2.3.2
	b)	Derive design stress block parameters for singly RC sections for LSM of design subjected to flexure.	05	1	1,2	1.2.1 ,1.3. 1
	c)	When is it required to design a doubly reinforced beam?	05	1	2	1.2.1 ,1.3. 1
	d)	How much minimum and maximum reinforcement is provided in RC column section? What is the purpose of column ties?	05	1	2	1.2.1 ,1.3. 1
Q2	a)	RC section 300mmx700mm depth overall and reinforced with 4-20mm dia is used as simply supported beam over an effective span of 4.5m. Determine the maximum udl beam can carry safely.Use M 35and Fe-415	08	1	3	2.1.3
	b)	Design RC beam of size 300x500 mm and span 5m subjected to service udl of 100kN/m .Use M-35 and Fe 415	12	1,2	6	2.4.1
Q3	a)	An isolated TEE beam section has an effective depth of 750mm ,effective flange width of 1000mm ,rib width of 300mm ,slab depth of 115mm .Design the beam to carry ultimate moment of 1500kN-m Use M-30and Fe-415.	12	1	3	2.3.1
	b)	Design one way slab panel of room of RCC residential building having dimensions 2.5mx 6m. Give appropriate checks. Use M30and Fe 415.Draw reinforcement details	08	1,2	6	2.4.1
Q4	a)	Design a RC slab for an interior panel of a room of a residential building. The size of panel is 4mx 5m.Assume live load of 2kN/m2.,Draw bottom reinforcement plan and section along	20	1,2	6	2.1.3

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Re Exam –July 2022

		short span. Give appropriate checks. Use M35 and Fe 415				
Q5	a)	What are the functions of distribution steel in one way slab?	05	1	2	1.4.1
	b)	Design short helically reinforced column to resist service load of 1600kN.Use M35 and Fe500.Draw reinforcement details	15	1,2	6	3.1.6
Q6	a)	A column of dimension 500mmx500mm is subjected to axial load of 1800kN.Design isolated footing for column assuming SBC as 225kN/m2.Use M35 and Fe 415.	15	1,2	6	3.1.6
	b)	Calculate load carrying capacity of column of size 500mmx600mm comprising of 8-32mm dia. Use M-30 and Fe-500.	05	1	2	1.3.1
Q7	a)	A rectangular beam 300mm x500mm effective depth is reinforced with 5 bars of 20mm dia in tension zone .The beam is subjected to udl of 70kN/m over span of 5m.Design shear reinforcement. Use M30 and Fe415	10	1,2	6	3.1.6
	b)	Determine ultimate load carrying capacity of column (300 x500)mm subjected to uniaxial bending reinforced with 4 bars of 20mm dia(each in one corner).Take xu /D= 1.1 .Assume fsc=0.87fy and fc=0.446fck.Assume C1= 0.385 and C2= 0.443.Use M30 and Fe 415.Also find eccentricity of the load.	10	1,2	4	2.4.1

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End Semester Examinations, May 2022

T.Y. B. Tech (Civil) Sem VI 30/5/22

Program: B.Tech. Civil Engineering

Course Code : **PE-BTC 644**

Name of the Course: **TQM and MIS in construction**

Duration: 3 Hour

Maximum points: 100

Semester: VI

Instructions:

1. Attempt any five Questions out of seven
2. Draw neat diagrams/use inbuilt graph paper from answer books
3. Answers to all sub questions should be grouped together
4. Assume suitable data if necessary and state the clearly.

Que. No.	Description	Points	CO	BL	PI
Q1	**a.** Discuss in detail the Principles of Quality Management System?	8	1	2	1.3.1
	b. The following data refers to the workability test of concrete for 20 samples. Use median and Up/Down test with Z = 1.96 which describes 95% of the chance of variation in the process and state whether the process is under control.	12	2	3	2.3.2

Sample No	Mean value	Sample No	Mean value	Sample No	Mean value	Sample No	Mean value
1	***24***	6	***44***	11	***19***	16	***43***
2	***21***	7	***23***	12	***43***	17	***46***
3	***19***	8	***27***	13	***37***	18	***19***
4	***22***	9	***26***	14	***32***	19	***20***
5	***25***	10	***35***	15	***28***	20	***22***

Q2	a) Discuss in brief the elements of Quality Documentation system.	8	1	1	1.2.1
	b) What are challenges in implementing TQM in construction?	6	2	3	2.3.1
	c) What are sources of information for a construction project?	6	1	2	1.4.1
Q3	**a.** Discuss in detail various phases of audit of a construction project.	10	1	2	1.3.1
	b. Following data shows the test results of water absorption properties of flooring tiles from ten different manufacturing lots. Calculate the control limits for Range chart and Mean chart, construct both the charts using graph sheet and state whether the process is under control?	10	2	4	2.3.2

Lot No. ➡ / Sample size ⬇	1	2	3	4	5	6	7	8	9	10
S-1	3.8	5.12	4.31	5.14	4.62	5.18	4.31	4.84	3.69	2.84
S-2	4.91	4.69	5.09	4.92	3.81	4.68	4.35	5.08	5.35	3.22
S-3	5.12	4.98	4.65	3.29	2.65	4.48	4.83	4.48	6.95	6.18
S-4	4.18	5.08	4.88	4.13	5.85	4.45	3.42	4.20	8.21	5.31
S-5	4.6	4.67	3.41	5.29	3.95	4.16	4.24	4.11	4.15	6.87
$\bar{X}$	**4.52**	**4.91**	**4.47**	**4.55**	**4.18**	**4.59**	**4.23**	**4.54**	**5.67**	**4.88**
$\bar{R}$	**1.32**	**0.45**	**1.68**	**2.00**	**3.20**	**1.02**	**1.41**	**0.97**	**4.52**	**4.03**

Q4	**a.** State the purpose of review meeting as per section 5.6 of ISO 9001:2000.	5	1	2	2.3.1
	b. What do you understand term product realization?	5	2	1	1.3.1
	c. A Q.C. **Engineer** checked the internal plastering work of 10 different walls of a residential building project and recorded number of defects exists on a wall surfaces as shown below. Construct appropriate quality control chart and state whether the process is in statistical control (use graph paper).	10	1	3	2.3.2

Wall No	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10
No. of defects	4	3	5	3	6	4	2	3	2	4

Q5	a.) A company manufactures FRP shutters for bathroom and toilet door with production capacity of 550 units per day. Following data refers to defective pieces observed during inspection. Construct appropriate quality control chart and state whether the process is in statistical control (use graph paper).	10	1	3	2.3.2

Lot No.	No. of defectives	Lot No.	No. of defectives	Lot No.	No. of defectives
1	**12**	6	**5**	11	**4**
2	**9**	7	**6**	12	**6**
3	**11**	8	**8**	13	**9**
4	**7**	9	**10**	14	**13**
5	**8**	10	**9**	15	**12**

b) Explain in detail section 6 on "Resource Management" of ISO9001:2000.	10	1	3	2.3.1
Q6 **a.** Describe in detail the activities you have observed during industrial visit for the implementation of quality management system.	10	1	2	1.4.1
b. What do you mean by optimal cost of quality? Draw the different curves for the costs of quality and explain them in detail.	10	2	3	1.3.1
Q7 Write explanatory notes on the following ***(any Four)***				
i) Responsibility Matrix	5	2	2	1.3.1
ii) Control charts	5	2	2	1.3.1
iii) Factors affecting deterioration of a structure	5	2	2	1.3.1
iv) Effects of dampness	5	2	2	1.3.1
v) Good Qualities of QC inspector	5	2	2	1.3.1
vi) Components of MIS	5	2	2	1.3.1

Tabular values for X-bar and range charts

Subgroup Size	A_2	d_2	D_3	D_4
2	1.880	1.128	----	3.268
3	1.023	1.693	----	2.574
4	0.729	2.059	----	2.282
5	0.577	2.326	----	2.114
6	0.483	2.534	----	2.004
7	0.419	2.704	0.076	1.924
8	0.373	2.847	0.136	1.864
9	0.337	2.970	0.184	1.816
10	0.308	3.078	0.223	1.777