JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech -V semester CE

COURSE CODE (CREDITS): 18B11CE515 (3) MAX. MARKS: 25

COURSE NAME: Design of Concrete Structures

COURSE INSTRUCTORS: Dr. Tanmay Gupta MAX. TIME: 1 Hour 30 Minutes

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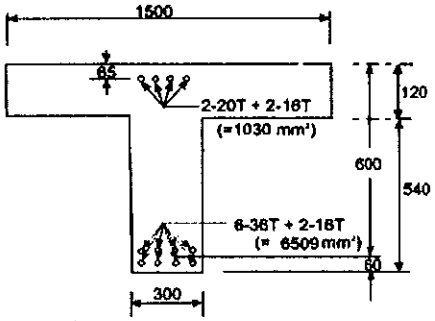
Note: (a)*All questions are compulsory. (b)Marks are indicated against each question in square brackets. (c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems IS 456:2000 is allowed*

Q.1 Why do we consider most of the beams as T or L-beams between the supports and rectangular beams over the support of continuous span? **2[CO2]**

Q.2 Determine the moment of resistance of the simply supported doubly reinforced flanged beam (isolated) of span 9 m as shown in Fig below Assume M 30 concrete and Fe 500 steel. **5[CO2]**



Q.3 Name and explain the three different failure modes of reinforced concrete beams under the combined effects of bending moment and shear force. **2[CO3]**

Q.4 A tapered cantilever beam is of 3 m span and has a constant width of 250 mm and tapers from 200 mm depth at free end to 500 mm at the support. Determine the nominal shear stress at a section 2 m from the free end assuming that the beam has to support a UDL of 50 kN/m and cover to centre of steel is 50mm. **3[CO3]**

Q.5 A reinforced concrete rectangular beam with b = 300 mm, d = 600 mm and D = 650 mm is subjected to factored shear force V_u = 70 kN in one section. Assuming the percentage of tensile reinforcement as 0.5 in that section, determine the factored torsional moment that the section can resist if (a) no additional reinforcement for torsion is provided, (b) maximum steel for torsion is provided in that section, and (c) determine the reinforcement needed for the case (b). Assume M 30 concrete, Fe 500 for longitudinal and Fe 415 for transverse reinforcing steel bars. **7[CO5]**

Q.6 Explain with sketch the share of loads by the supporting beams in one- and two- way slabs. **3[CO2]**

Q.7 Derive the expression of determining the development length of a single bar in tension. State the changes, if any, for the compression bars. **3[CO3]**

f_y
240
250
415
480
500
f_{ck}
30

TABLE 4 FLEXURE — REINFORCEMENT PERCENTAGE, p_t FOR SINGLY REINFORCED SECTIONS

f_{ck} = 30 N/mm²

M_u/bd^2, N/mm²	f_y, N/mm²					M_u/bd^2, N/mm²	f_y, N/mm²				
	240	250	415	480	500		240	250	415	480	500
0·30	0·145	0·140	0·084	0·073	0·070	2·55	1·374	1·319	0·794	0·687	0·659
0·35	0·170	0·163	0·098	0·085	0·082	2·60	1·404	1·348	0·812	0·702	0·674
0·40	0·195	0·187	0·113	0·097	0·093	2·65	1·435	1·378	0·830	0·718	0·689
0·45	0·219	0·211	0·127	0·110	0·105	2·70	1·467	1·408	0·848	0·733	0·704
0·50	0·244	0·235	0·141	0·122	0·117	2·75	1·498	1·438	0·866	0·749	0·719
0·55	0·269	0·259	0·156	0·135	0·129	2·80	1·530	1·469	0·885	0·765	0·734
0·60	0·294	0·283	0·170	0·147	0·141	2·85	1·562	1·499	0·903	0·781	0·750
0·65	0·320	0·307	0·185	0·160	0·153	2·90	1·594	1·530	0·922	0·797	0·765
0·70	0·345	0·331	0·200	0·172	0·166	2·95	1·626	1·561	0·940	0·813	0·781
0·75	0·370	0·356	0·214	0·185	0·178	3·00	1·659	1·592	0·959	0·829	0·796
0·80	0·396	0·380	0·229	0·198	0·190	3·05	1·691	1·624	0·978	0·846	0·812
0·85	0·422	0·405	0·244	0·211	0·202	3·10	1·725	1·656	0·997	0·862	0·828
0·90	0·447	0·429	0·259	0·224	0·215	3·15	1·758	1·687	1·017	0·879	0·844
0·95	0·473	0·454	0·274	0·237	0·227	3·20	1·791	1·720	1·036	0·896	0·860
1·00	0·499	0·479	0·289	0·250	0·240	3·25	1·825	1·752	1·055	0·913	0·876
1·05	0·525	0·504	0·304	0·263	0·252	3·30	1·859	1·785	1·075	0·930	0·892
1·10	0·552	0·529	0·319	0·276	0·265	3·35	1·893	1·818	1·095	0·947	0·909
1·15	0·578	0·555	0·334	0·289	0·277	3·40	1·928	1·851	1·115	0·964	0·925
1·20	0·604	0·580	0·350	0·302	0·290	3·45	1·963	1·884	1·135	0·981	0·942
1·25	0·631	0·606	0·365	0·315	0·303	3·50	1·998	1·918	1·156	0·999	0·959
1·30	0·658	0·631	0·380	0·329	0·316	3·55	2·034	1·952	1·176	1·017	0·976
1·35	0·685	0·657	0·396	0·342	0·329	3·60	2·069	1·986	1·197	1·035	0·993
1·40	0·712	0·683	0·411	0·356	0·342	3·65	2·105	2·021	1·218	1·053	1·011
1·45	0·739	0·709	0·427	0·369	0·355	3·70	2·142	2·056	1·239	1·071	1·028
1·50	0·766	0·735	0·443	0·383	0·368	3·75	2·178	2·091	1·260	1·089	1·046
1·55	0·793	0·762	0·459	0·397	0·381	3·80	2·215	2·127	1·281	1·108	1·063
1·60	0·821	0·788	0·475	0·410	0·394	3·85	2·253	2·163	1·303	1·126	1·081
1·65	0·849	0·815	0·491	0·424	0·407	3·90	2·291	2·199	1·325	1·145	1·099
1·70	0·876	0·841	0·507	0·438	0·421	3·95	2·329	2·236	1·347	1·164	1·118
1·75	0·904	0·868	0·523	0·452	0·434	4·00	2·367	2·273	1·369	1·184	
1·80	0·932	0·895	0·539	0·466	0·448	4·05	2·406	2·310	1·391		
1·85	0·961	0·922	0·556	0·480	0·461	4·10	2·445	2·348	1·414		
1·90	0·989	0·950	0·572	0·495	0·475	4·15	2·485	2·386			
1·95	1·018	0·977	0·589	0·509	0·488	4·20	2·525	2·424			
2·00	1·046	1·005	0·605	0·523	0·502	4·25	2·566	2·463			
2·05	1·075	1·032	0·622	0·538	0·516	4·30	2·607	2·502			
2·10	1·104	1·060	0·639	0·552	0·530	4·35	2·648	2·542			
2·15	1·134	1·088	0·656	0·567	0·544	4·40	2·690	2·583			
2·20	1·163	1·116	0·673	0·581	0·558	4·45	2·733	2·623			
2·25	1·192	1·145	0·690	0·596	0·572						
2·30	1·222	1·173	0·707	0·611	0·587						
2·35	1·252	1·202	0·724	0·626	0·601						
2·40	1·282	1·231	0·742	0·641	0·615						
2·45	1·312	1·260	0·759	0·656	0·630						
2·50	1·343	1·289	0·777	0·671	0·645						