06

Optional Paper Civil Engineering Paper – I

Time: 3 Hours

Maximum Marks: 200

IMPORTANT NOTES / महत्वपूर्ण निर्देश

- (A) Please fill up the OMR Sheet of this Question Answer Booklet properly before answering. Please also see the directions printed on the obverse before filling it. प्रश्नोत्तर पुस्तिका में प्रश्न हल करने से पूर्व उसके संलग्न ओ.एम.आर. पत्रक को भली प्रकार भर लें। उसे भरने हेतु उसके पृष्ठ भाग पर मुद्रित निर्देशों का अध्ययन कर लें।
- (B) The question paper has been divided into three Parts A, B and C. The number of questions to be attempted and their marks are indicated in each part.

 प्रश्न-पत्र अ, व और स तीन भागों में विभाजित है । प्रत्येक भाग में से किये जाने वाले प्रश्नों की संख्या और उनके अंक उस भाग में अंकित किये गये हैं ।
- (C) Attempt answers in English. उत्तर अंग्रेजी भाषा में दीजिये ।
- (D) Answers to all the questions of each part should be written continuously in the script and should not be mixed with those of other parts. In the event of candidate writing answers to a question in a part different to the one to which the question belongs, the question will not be assessed by the examiner.

 उत्तर पुस्तिका में प्रत्येक भाग के समस्त प्रश्नों के उत्तर क्रमवार देने चाहिये तथा एक भाग में दूसरे भाग के उत्तर नहीं मिलाने चाहिये। एक भाग में दूसरे भाग के प्रश्न के उत्तर लिखे जाने पर ऐसे प्रश्न को जाँचा नहीं जा सकता हैं।
- (E) The candidates should not write the answers beyond the limit of words prescribed in parts A, B and C failing this the marks can be deducted. अभ्यर्थियों को भाग अ, व और स में अपने उत्तर निर्धारित शब्दों की सीमा से अधिक नहीं लिखने चाहिये। इसका उल्लंघन करने पर अंक काटे जा सकते हैं।
- (F) In case the candidate makes any identification mark i.e. Roll No./Name/Telephone No./Mobile No. or any other marking either outside or inside the answer book, it would be treated as resorting to using unfair means. In such a case his candidature shall be rejected for the entire examination by the Commission.

 अभ्यर्थी द्वारा उत्तर पुस्तिका के अंदर अथवा वाहर पहचान चिन्ह यथा रोल नम्बर / नाम / मोर्बाईल नम्बर / टेलीफोन नम्बर लिखे जाने या अन्य कोई निशान इत्यादि अंकित किये जाने को अनुचित साधन मान जायेगा। आयोग द्वारा ऐसा पाये जाने पर अभ्यर्थी की सम्पूर्ण परीक्षा में अभ्यर्थिता रद्द कर दी जायेगी।

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Note:

Attempt all the twenty questions. Each question carries 2 marks. Answer should

	not exc	ceed 15	words.						
1 De	fine yield	point.							
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2 W	hat is the	relation	between	modulus	of rigidity	/ (G) a	and modulus	of elasticit	y (E)?
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3 D	ifferentiate	betweer	ı major p	principal s	stress and	minor	principal str	ess.	
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١	What is kinematic viscosity? What are its units?		
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	Describe strain energy in terms of principal stresses.		
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9	Define streamlines.				
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8	Differentiate between			yancy.	
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7	Differentiate between	total pressure	and centre of	pressure.	

10	What are the limitations of the Bernoulli's equation?	
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11	A soil specimen has water content of 10 percent and a wet density of 20 kN	 /m ²
	If the specific gravity of solids is 2.7, determine the dry unit weight and void re-	atio
12	What are the different methods to determine the specific gravity of solid particles the laboratory?	s in
		
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15	What are different factors of safety used in the stability of slopes?	
14	Differentiate between coefficient of compressibility and coefficient of volume	e change.
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16	Wha	t are	e diff	ferent	types	of bea	ring	capacit	y failu	res?					
															
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17				diffe	rent t	ypes of	tens	ion me	mbers	are use	ed?		···.	_	
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8	What	are	the	parar	neters	include	for	partial	safety	factor	used	for	material	streng	gth?
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9	Explain	n how	net effe	ective a	area fo	or angle	and	Tees	in ter	ision	members	is	computed
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0	What	are diff	erent r	nodes	of fail	ure of	a stee	el coli	umn?				
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Note	:	Att not	tempt a	ll :	the twel s 50 words	/ e S.	questions	Each	question	carries 5 marks. Answer should
21	Discı	188	differen	t t	theories o	ηf	failure of	f metal	s subjecte	ed to steady constant stresses.
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22	With	neat	sketch	es,	explain	th	e conditio	ns of e	quilibrium	floating and sub-merged bodies.
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25	Discuss	Three-pha	se diagran	n in terms	of ve	oid ratio	0.				
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26	Discuss validity.	Terzaghi's	theory of	consolida c	ation,	stating	the v	various	assumptions	and	thei
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27	Derive a relationship between the principal stresses at failure by using Mohr-Coulomb failure criterion.
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	What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m ³ .
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32	Write the	principal	step in	the design	of a steel	member	subjected	to axial	tension.
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Marks : 100

Note	Attempt any 5 questions. Each question carries 20 marks. Answer should not exceed 200 words.
33	A bolt is subjected to an axial pull of 12 kN together with a transverse shear force of 6 kN. Determine the diameter of the bolt according to the five different failure theories Given the following: Elastic limit in tension: 300 N/mm ² Factor of safety: 3
	Poisson's ratio : 0.3

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36	of 800 kN. Find the size of the footing if the desired factor of safety is 3. The soil has the following properties: Void ratio = 0.55: Degree of saturation = 50 percent: specific gravity = 2.67,
	C = $8kN/m^2$: $\phi = 30^\circ$. Use Terzaghi's analysis ($\phi = 30^\circ$, Nc = 37.2, Nq = 22.5 and Ny=19.7).

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38 Analyse the continuous beam loaded as shown in figure by the method of moment distribution. Sketch the bending moment and shear force diagrams and showing critical points.

EI = constant
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2m 3m 4m 1.5m 2.5m 7

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