





ESE 2020 Preliminary Examination Civil Engineering | Set-A

Expe	Expected Cutoff of ESE 2020 Prelims (Out of 500 Marks)			Actı	u <b>al Cutol</b> (Out	ff of ESE 2 t of 500 Ma	2 <b>019 Preli</b> arks)	ms	
Branch	Gen	ОВС	SC	ST	Branch	Gen	OBC	SC	ST
CE	210-220	205-215	170-180	170-180	CE	188	185	143	159
ME	245-255	245-255	210-220	210-220	ME	187	187	166	169
EE	225-235	215-225	195-205	195-205	EE	221	211	191	172
E&T	235-245	225-235	185-195	185-195	E&T	226	221	176	165

#### **Civil Engineering Paper** Analysis : ESE 2020 Prelims Exam

SI.	Subjects	No. of Qs.
1	Building Materials	15
2	Strength of Materials	18
3	Structural Analysis	06
4	Design of Steel Structures	13
5	RCC & Prestress Concrete	10
6	Construction Practice, Planning & Management	12
7	Fluid & Hydraulic Machines + OCF	12
8	Engineering Hydrology	02
9	Irrigation Engineering	08
10	Environmental Engineering	13
11	Geo-technical Engineering	14
12	Surveying and Geology	13
13	Transportation Engineering	06
14	Railway Engineering	08

#### **UPSC ESE/IES Prelims 2020**

Civil Engineering Analysis & Expected Cut-off by MADE EASY Faculties

#### https://youtu.be/YKX-IrNxvZE

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### **ESE 2020** Streams : CE, ME, EE, E&T

Batches commencing from

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ADE EASY	India's Best Institute for IES, GATE & PSUs	Civil Engineering   Set-A
1.	When the deposit of efflorescence is n area of the brick, the presence of effl (a) Moderate (c) Heavy	nore than 10% but less than 50% of the expose orescence is (b) Slight (d) Serious
Ans.	(a) NIL negligible SLIGHT $\leq 10\%$ MODERATE 10 - 50% HEAVY/HIGH > 50% SERIOUS > 50% and accompanied b	by powdering or flacking of exposed surface.
2.	Mohs scale is used for stones to det	ermine
	(a) Flakiness index (c) Strength	(b) Durability (d) Hardness
Ans.	(d)	
		End of Solution
3.	<ol> <li>Which of the following conditions are re</li> <li>Concrete to be used in foundation sulphates.</li> <li>Concrete used for fabrication of piptor sulphate bearing soils.</li> <li>Concrete to be used in the constant (a) 2 and 3 only</li> <li>(c) 1 and 3 only</li> </ol>	commended for using sulphate resisting cement n and basement, where soil is not infested wit bes which are likely to be buried in marshy regio ruction of sewage treatment works. (b) 1 and 2 only (d) 1, 2 and 3
Ans.	(a)	
		End of Solution
4.	<ul><li>Which one of the following cements is</li><li>(a) Quick setting Portland cement</li><li>(c) Calcium Chloride cement</li></ul>	s a deliquescent? (b) White and Coloured cement (d) Water Repellent cement
Ans.	(c)	
5.	Consider the following data for concre Water-cement ratio = 0.50 Water = 191.6 litre	End of Solution
	The second stand and second standard standards with the second	
	The required cement content will be (a) 561 kg/m <sup>3</sup>	(b) 472 kg/m <sup>3</sup>
	The required cement content will be (a) 561 kg/m <sup>3</sup> (c) 383 kg/m <sup>3</sup>	(b) 472 kg/m <sup>3</sup> (d) 294 kg/m <sup>3</sup>

	$\frac{W}{C}$ (By mass) = 0.5
	C = W
	$V_{\text{olume}} = \frac{0.5}{0.5}$
	Mass of water = $0.1916 \times 10^3 = 191.6 \text{ kg}$
	$C = \frac{191.6}{2.5} = 383.2 \text{ kg}$
	0.5
6.	The strength of a fully matured concrete sample is 500 kg/cm <sup>2</sup> . When cured at an average temperature of 20°C in day, 10°C in night, datum temperature $T_0$ is –11°C. If Plowma constants <i>A</i> is 32 and <i>B</i> is 54, the strength of identical concrete at 7 days will be near (a) 333 kg/cm <sup>2</sup> (b) 312 kg/cm <sup>2</sup> (c) 272 kg/cm <sup>2</sup>
Ans.	(a)
	$M = (20 - (-11)) \times 12 \times 7 + (10 - (-11)) \times 12 \times 7$ $= 2604 + 1764$
	$= 4368^{\circ}$ C – Hrs
	Strength, $t = a + b \log_{10} (M \times 10^{-3})$ = 32 + 54 log <sub>10</sub> (4368 × 10 <sup>-3</sup> )
	= 66.57%
	Strength of concrete at 7 days = $0.6657 \times 500$ = $332.85 \text{ kg/cm}^2$
	= 333 kg/cm <sup>2</sup>
7.	A sample of concrete is prepared by using 500 g of cement with water cement rat of 0.55 and 240 N/mm <sup>2</sup> intrinsic strength of gel. The theoretical strength of concrete of full hydration will be nearly (a) 148 N/mm <sup>2</sup> (b) 126 N/mm <sup>2</sup> (c) 104 N/mm <sup>2</sup> (d) 82 N/mm <sup>2</sup>
Ans.	(c)
	W or content = 500 gm
	$\overline{C} = 0.00$
	Vergin of water = $275 \text{ m}$ Volume of water = 275 ml
	Gel space ratio = $\frac{0.657C}{0.0100} = \frac{0.657 \times 500}{0.0100} = \frac{328.5}{1000} = 0.756$
	$0.319C + W$ $0.319 \times 500 + 275$ 434.5 Theoretical strength of concrete = 240 (0.756) <sup>3</sup> = 103.71 N/mm <sup>2</sup>

	The company and water a	
в.	(a) Crazing	(b) Efflorescence
	(c) Sulphate deterioration	(d) Laitance
Ans.	(d)	End of Solution
Э.	Polymer concrete is most suitable	for
	(a) Sewage disposal works	
	(b) Mass concreting works	ir conditioned building
	(d) Road repair works	n-conditioned building
Ans.	(d)	
10.	Which one of the following limes wi	Il be used for finishing coat in plastering and whi
	washing?	
	(a) Semi Hydraulic lime	(b) Kankar lime
	(c) Magnesium/Dolomitic lime	(d) Eminently Hydraulic lime
Ans.	(c)	End of Solutio
11.	Which one of the following light weig	ght element will be added to enhance the protectiv
	properties for X-ray shielding morta	Irs?
	(a) Sodium	(b) Potassium
		(d) Calcium
Ans.	(c) Lithium	(d) Calcium
Ans.	(c) Lithium	(d) Calcium
Ans. 12.	<ul><li>(c) Litnium</li><li>(c)</li><li>Which one of the following stone is Portland cement?</li></ul>	(d) Calcium End of Solution produced by moulding a mixture of iron slag an
Ans. 12.	<ul> <li>(c) Litnium</li> <li>(c)</li> <li>Which one of the following stone is Portland cement?</li> <li>(a) Imperial stone</li> </ul>	<ul> <li>(d) Calcium</li> <li>End of Solution</li> <li>produced by moulding a mixture of iron slag and (b) Garlic stone</li> </ul>
Ans. 12.	<ul> <li>(c) Litnium</li> <li>(c)</li> <li>Which one of the following stone is Portland cement?</li> <li>(a) Imperial stone</li> <li>(c) Ransom stone</li> </ul>	<ul> <li>(d) Calcium</li> <li>End of Solution</li> <li>produced by moulding a mixture of iron slag art</li> <li>(b) Garlic stone</li> <li>(d) Victoria stone</li> </ul>
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Ans. 12. Ans. 13.	<ul> <li>(c) Litnium</li> <li>(c)</li> <li>Which one of the following stone is Portland cement?</li> <li>(a) Imperial stone</li> <li>(c) Ransom stone</li> <li>(b)</li> <li>When a round bar material with dian of 110 GN/m<sup>2</sup> and shear modulus of</li> </ul>	(d) Calcium End of Solution produced by moulding a mixture of iron slag ar (b) Garlic stone (d) Victoria stone End of Solution End of Solution neter of 37.5 mm, length of 2.4 m, Young's module 42 GN/m <sup>2</sup> is stretched for 2.5 mm, its Bulk module
Ans. 12. Ans. 13.	<ul> <li>(c) Litnium</li> <li>(c)</li> <li>Which one of the following stone is Portland cement?</li> <li>(a) Imperial stone</li> <li>(c) Ransom stone</li> <li>(b)</li> <li>When a round bar material with diar of 110 GN/m<sup>2</sup> and shear modulus of will be nearly</li> <li>(a) 104 ON/m<sup>2</sup></li> </ul>	(d) Calcium End of Solution produced by moulding a mixture of iron slag ar (b) Garlic stone (d) Victoria stone End of Solution End of Solution neter of 37.5 mm, length of 2.4 m, Young's module 42 GN/m <sup>2</sup> is stretched for 2.5 mm, its Bulk module
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Ans. 12. Ans. 13.	<ul> <li>(c) Litnium</li> <li>(c)</li> <li>Which one of the following stone is Portland cement?</li> <li>(a) Imperial stone</li> <li>(c) Ransom stone</li> <li>(b)</li> <li>When a round bar material with diar of 110 GN/m<sup>2</sup> and shear modulus of will be nearly</li> <li>(a) 104 GN/m<sup>2</sup></li> <li>(c) 84 GN/m<sup>2</sup></li> </ul>	<ul> <li>(d) Calcium</li> <li>End of Solution</li> <li>produced by moulding a mixture of iron slag and</li> <li>(b) Garlic stone</li> <li>(d) Victoria stone</li> <li>End of Solution</li> <li>neter of 37.5 mm, length of 2.4 m, Young's modulu</li> <li>42 GN/m<sup>2</sup> is stretched for 2.5 mm, its Bulk modulu</li> <li>(b) 96 GN/m<sup>2</sup></li> <li>(d) 76 GN/m<sup>2</sup></li> </ul>







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20.	At a point in a two dimensional perpendicular planes are $\sigma_{xx}$ and $\sigma$ will become zero when the value	stress system, the normal stress on two mutually $\tau_{yy}$ and shear stress is $\tau_{xy}$ . One of the principal stresses of shear stress $\tau_{xy}$ is
	(a) $\pm (\sigma_{xx} \sigma_{yy})$	(b) $\pm \sqrt{\sigma_{xx} - \sigma_{yy}}$
	(c) $\pm \sqrt{\sigma_{xx} + \sigma_{yy}}$	(d) $\pm \sqrt{\sigma_{xx}\sigma_{yy}}$
Ans.	(d)	
	$\sigma_1 = \frac{\sigma_{xx} + \sigma_{xx}}{2}$	$\frac{\sigma_{yy}}{2} + \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2 + \tau_{xy}^2} = +ve \neq 0$
	$\therefore \qquad \sigma_2 = 0$	
	$\frac{\sigma_{xx} + \sigma_{yy}}{2} - \sqrt{\left(\frac{\sigma_{xx} - \sigma_{yy}}{2}\right)^2} + \tau_{xy}^2 =$	= 0
	$\tau^2_{xy} = \sigma_{xx} \cdot \sigma$	W
	$\therefore \qquad \qquad \tau_{xy} = \pm \sqrt{\sigma_{xx}}$	$\overline{\cdot \sigma_{yy}}$
21.	The deflection $\delta$ of the closed co (a) $\frac{WR^2n}{8Cd^3}$	il helical spring is (b) $\frac{64WR^3n}{Cd^4}$
	(c) $\frac{128WR^3n}{Cd^2}$ where : <i>W</i> is the axial load <i>R</i> is the radius of the color <i>n</i> is the number of turns <i>C</i> is the modulus of rigid <i>d</i> is the diameter of the <i>x</i>	(d) $\frac{64WR^2n}{Cd^2}$ il of coil lity wire of the coil
Ans.	(b)	
	Strain energy in spring = $\frac{T^2L}{2GJ}$	
	$=\frac{P^2R^2}{2}$	$(2\pi Rn)$
	2G -	$\frac{\pi}{32}d^4$
	$=\frac{32P^2H}{Gd}$	$\frac{\overline{A}^3 n}{4}$
	By Castigliano's theorem, $\delta = \frac{\partial U}{\partial P} =$	$\frac{\partial}{\partial P} = \frac{32P^2R^3n}{Gd^4}$
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39.	The splicing of a column becomes no	ecessary, where
	(a) The available length of structural	steel section is less than the required length of
	(b) Section remains same throughou	t at all floors.
	(c) Only riveted columns are to be c	lesigned.
	(d) Splices should be designed to c	arry axial loads only.
Ans.	(a)	
		End of Solution
40.	A tie bar 50 mm × 8 mm is to carry a	load of 80 kN. A specimen of same quality stee
	of cross-sectional area is 250 mm <sup>2</sup> . I	t the maximum load carried by the specimen i
	(a) 133 mm	(b) 126 mm
	(c) 113 mm	(d) 106 mm
Ans.	(c)	
	Gauge length = $5.65\sqrt{A_o}$	
	= 5.65\sqrt{50>}	<8 = 113 mm
		End of Solution
44	The strength of a solution dependence	n which of the following importantions?
41.	1. The material being isotropic and	homogeneous.
	2. Geometric variations of column.	
	3. Eccentricity of load.	
	(a) 1, 2 and 3 (c) 1 and 3 only	(b) 2 and 3 only (d) 1 and 2 only
Δns	(b)	
		End of Solution
40	Which of the following types of follow	a coolur in the beam column connections?
42.	1. Failure by lateral-torsional bucklin	g.
	2. Failure by combined instability in	both the principal directions.
	3. Failure by combined twisting and	I bending on the torsionally weak sections.
	4. Failure by combined twisting and the shear centre.	bending when plane of bending does not contai
	(a) 1, 2 and 3 only	(b) 1, 3 and 4 only
	(c) 1, 2 and 4 only	(d) 2, 3 and 4 only
Ans.	(a)	
		End of Solution



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48.	Which one of the following is the	correct assumption made in evaluation of fully plast
	(a) The upper and lower yield stre	esses and the modulus of elasticity have different value
	in compression and tension.	
	<ul><li>(b) The material is homogeneous</li><li>(c) There will be resultant axial</li></ul>	s and isotropic in both the elastic and plastic state: force on the beam
	(d) Some layers of the material a laterally under stress.	are not free to expand and contract longitudinally an
Ans.	(b)	
		End of Solution
49.	As per IS-456 : 2000, cracking of be limited by	f concrete in tension zone cannot be avoided but ca
	1. Adhering to the codal require	ements of minimum steel area
	<ol> <li>Proper and protonged curring</li> <li>Increasing water cement rational statement ratistexeccccccccccccccccccccccccccccccccccc</li></ol>	o to increase workability
	(a) 1 and 2 only	(b) 1 and 3 only
	(c) 2 and 3 only	(d) 1, 2 and 3
Ans.	(a) Increasing water cement ratio w	ill reduce the strength of concrete. This may lead
	orabiling of bonorole on tension	End of Solutio
50.	Which of the following assumptio	ns are made with respect to Euler's theory applied
	columns?	uniform
	2. The length of the column is	very large compared to the lateral dimensions.
	3. The direct stress is large wh	en compared with the bending stress.
	(a) 1, 2 and 3 (c) 2 and 3 only	(b) 1 and 3 only (d) 1 and 2 only
۸۵۵	(d)	
AII5.	The direct stress is small compa	ared to bending stress.
		End of Solutio
51.	A rectangular beam with $b = 20$	0 mm and effective depth $d = 300$ mm is subjected
	to limit state shear of 80 kN and	torsional moment of 6 kNm. The equivalent value
	shear will be	(b) 116 KN
	(c) 104 kN	(d) 92 kN
Ans.	(a)	
	V = V +	1.67 <u>u</u>
	$v_{ue} = v_u + -$	В



Ans.	(b)	
	1. Factor of safety against sliding =	1.50.
	3 Length of RW $>$ 10 m in one go	
		End of Solution
55.	Which of the following are the desirable	properties for efficient functioning in design fo
	movement joint of water tank?	
	<ol> <li>The joint should accommodate reperiod water-tightness.</li> </ol>	eated movement of the structure without loss c
	<ol> <li>The design should provide for exclu closing of the joint.</li> </ol>	sion of grit and debris which would prevent the
	<ol> <li>The material used in the construction in hot weather or become brittle in</li> </ol>	on of movement joints should not slump undul cold weather.
	(a) 1, 2 and 3	(b) 1 and 2 only
	(c) 1 and 3 only	(d) 2 and 3 only
Ans.	(a)	2
	Provision No. 10.2 IS 3370 - Part II/P-6	б.
		End of Solution
	(a)  0  0  0  0  0  0  0  0  0	
	(c) 1.8 N/mm <sup>2</sup>	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup>
Ans.	(a) 0.8 N/mm <sup>2</sup> (c) 1.8 N/mm <sup>2</sup> (b)	<ul> <li>(b) 1.1 N/mm<sup>2</sup></li> <li>(d) 2.2 N/mm<sup>2</sup></li> </ul>
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.6 N/IIII <sup>2</sup> (c) 1.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (c) 1.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100 kN	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100  kN V = 100  kN	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100 kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = \frac{100 \times 200}{200 \times 200}$	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100 kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = \frac{100 \times 200 \times 200 \times 200}{200 \times 200 \times 200}$ = 1.11 N/mm <sup>2</sup>	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN
Ans.	(a) 0.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100  kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = \frac{100 \times 200 \times 200}{200 \times 200 \times 200}$ $= 1.11 \text{ N/mm^2}$	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN 1000 < 450
Ans.	(a) 0.5 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100  kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = \frac{100 \times 200 \times 200}{200 \times 200 \times 200}$ $= 1.11 \text{ N/mm^2}$ Which of the following are correct for c	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN 1000 450 <i>End of Solution</i> over to reinforcement?
Ans. 57.	(a) 0.8 N/mm <sup>2</sup> (b) Total load Maximum shear force = $\frac{wL}{2} = \frac{200}{2}$ V = 100  kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = 100 \times 200 \times 200$	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN 1000 450 <i>End of Solution</i> over to reinforcement? mum clear cover of 20 mm or diameter of suc
Ans. 57.	(a) 0.5 N/mm <sup>2</sup> (c) 1.8 N/mm <sup>2</sup> (b) Maximum shear force $= \frac{wL}{2} = \frac{200}{2}$ V = 100 kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = 100 \times 200 \times 20$	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN 1000 (450 <i>End of Solution</i> over to reinforcement? mum clear cover of 20 mm or diameter of suc
Ans. 57.	(a) 0.5 N/mm <sup>2</sup> (c) 1.8 N/mm <sup>2</sup> (b) Maximum shear force $= \frac{wL}{2} = \frac{200}{2}$ V = 100  kN Nominal shear stress, $\tau_v = \frac{V}{Bd} = 100 \times 200 $	(b) 1.1 N/mm <sup>2</sup> (d) 2.2 N/mm <sup>2</sup> = 200 kN 1000 (450 <i>End of Solution</i> over to reinforcement? mum clear cover of 20 mm or diameter of such ss than 25 mm nor less than twice the diameter



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<ul> <li>60. Which of t I-section b 1. The bi 2. Its bel 3. It is lo (a) 1 and (c) 1 and (c) 1 and Ans. (b)</li> <li>61. In an exca effectively the duration (a) 5 days (c) 7 days (c) 7 days Ans. (a)</li> <li>62. The project 1. Clearly identifi 2. Identifi 3. Provid design (a) 1 and (c) 1 and Ans. (c) Planning is</li> </ul>	the following assumptions beam? eam is initially distorted. haviour is elastic. aded by equal and opp 2 only 3 only wation of 3000 cub.mtr of employed on the job. If a on of excavation activity s for excavation = $\frac{300}{6 \times 100}$ = 5 days	as are correct for the lateral torsional buckling of ar bosite end moments in the plane of the web. (b) 2 and 3 only (d) 1, 2 and 3 <u>End of Solution</u> of common earth for a canal project, 6 men can be an output of a man is taken as 100 cub.mtr per day will be (b) 6 days (d) 8 days <u>CO m<sup>3</sup></u> <u>O m<sup>3</sup>/day</u> the the pack of downs are interedentiations into a downs of solution
<ul> <li>Ans. (b)</li> <li>61. In an excareffectively the duratic (a) 5 days (c) 7 days (c) 7 days</li> <li>Ans. (a)</li> <li>62. The project 1. Clearly identified 2. Identified 2. Identified 3. Provided design (a) 1 and (c) 1 and (c) 1 and Ans. (c)</li> </ul>	evation of 3000 cub.mtr of employed on the job. If a point of excavation activity s for excavation = $\frac{300}{6 \times 100}$ = 5 days et plan for construction: y defines project's scope	<u>End of Solution</u> of common earth for a canal project, 6 men can be an output of a man is taken as 100 cub.mtr per day will be (b) 6 days (d) 8 days 0 m <sup>3</sup> 0 m <sup>3</sup> /day s
<ul> <li>61. In an excale ffectively the duratio (a) 5 days (c) 7 days (c) 7 days</li> <li>Ans. (a)</li> <li>Duration</li> <li>62. The project 1. Clearly identifi 2. Identifi 3. Provid desigr (a) 1 and (c) 1 and (c) 1 and Ans. (c)</li> </ul>	evation of 3000 cub.mtr c employed on the job. If a on of excavation activity for excavation = $\frac{300}{6 \times 100}$ = 5 days et plan for construction: y defines project's scope	of common earth for a canal project, 6 men can be an output of a man is taken as 100 cub.mtr per day will be (b) 6 days (d) 8 days 0 m <sup>3</sup> /day 5 <i>End of Solution</i>
Ans. (a) Duration 62. The project 1. Clearly identifi 2. Identifi 3. Provid desigr (a) 1 and (c) 1 and Ans. (c) Planning is	for excavation = $\frac{300}{6 \times 100}$ = 5 days et plan for construction: / defines project's scope	00 m <sup>3</sup> 0 m <sup>3</sup> /day 5 <i>End of Solution</i>
Duration 62. The project 1. Clearly identifi 2. Identifi 3. Provid design (a) 1 and (c) 1 and Ans. (c) Planning is	for excavation = $\frac{300}{6 \times 100}$ = 5 days et plan for construction: / defines project's scope	00 m <sup>3</sup> 0 m <sup>3</sup> /day End of Solution
<ul> <li>62. The project</li> <li>1. Clearly identifi</li> <li>2. Identifi</li> <li>3. Provid design</li> <li>(a) 1 and</li> <li>(c) 1 and</li> <li>Ans. (c)</li> <li>Planning is</li> </ul>	et plan for construction: / defines project's scope	End of Solution
Ans. (c) Planning is	able, attainable and veri ies critical activities, thus es the basis for co-ordir ners, quality surveyors, s 2 only 3 only	<ul> <li>if work. It breaks down project objectives into clear</li> <li>ifiable goals.</li> <li>s enabling management of projects by exceptions</li> <li>nating the efforts of clients, consultants, architects</li> <li>specialists, suppliers, contractors and project staff</li> <li>(b) 1, 2 and 3</li> <li>(d) 2 and 3 only</li> </ul>
the objecti gross requ for various	the most important phas ves of a project, listing of irement for material, man activities to bring abou	se of project management planning involves defining f tasks, or jobs they must be performed, determining power and preparing estimate of costs and duration ut satisfactory completion of project.
<b>63.</b> Which one (a) Critica (c) Procee	e of the following technic I Path Method dure Network Analysis	ques is not covered in Project Network Analysis? (b) Program Evaluation and Review Technique (d) Measurement Book
Ans. (d)		





	(c) A gradual increase in resources	
	(d) A gradual decrease in resource	у. IS.
Ans	(b)	
	(0)	End of Solution
71.	In PERT technique, the time estima follow	te of activities and probability of their occurrenc
	(a) Binomial distribution	(b) Normal distribution
	(c) Poisson distribution	(d) β-distribution
Ans.	(d)	
	All activities will follow $\beta$ -distribution to follow normal distribution of freq	n of frequency and project as a whole is assume uency according to central limit theorem.
		End of Solution
72.	Indirect cost due to accidents inclu	des
	(a) Legal charges	
	(b) Medical expenses for the injure	d
	(c) Compensation amount to the inj	ured
Ans.	(b)	End of Solution
73.	An oil of specific gravity 0.9 contain and for the density of water = 1000 k will be	ned in a vessel. At a point the height of oil is 40 ng/m <sup>3</sup> , the corresponding height of water at the poin
	(a) 28 m	(b) 32 m
	(c) 36 m	(d) 40 m
Ans.	(c)	
	Pressure due to oil column height	= Pressure due to water column height
	$(900)g \cdot 40 = (1000)gr$	n water column
		End of Solution
74	When speed changes in case of c	entrifugal nump, which of the following points ar
/ 4.	correct?	entingal pump, which of the following points a
	1. The shape of the velocity triang	gle will remain same.
	2. Various angles will remain same	2.
	3. Magnitude of velocities will cha	nge proportionately.
	(a) 1 and 2 only	(b) 1 and 3 only
	(c) 2 and 3 only	(a) 1, 2 and 3
Ans.	(d)	
		End of Solution







# **General Studies & Engineering Aptitude** for ESE 2021 Prelims

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	(a) 245 rpm (c) 205 rpm	(b) 225 rpm (d) 185 rpm
Ans.	(c)	
	$N_{s} = \frac{N\sqrt{P}}{H^{5/4}}$	
	$=\frac{135\sqrt{7225}}{(25)^{5/4}}$	- = 205.27 (SI units)
34.	Which one of the following is an exam	ple of bodies where both drag and lift forces ar
	produced? (a) Hydrofiles (c) Flow of water past a bridge pier	<ul><li>(b) A tall chimney exposed to wind</li><li>(d) Motion of aeroplanes, submarines, torpedoe</li></ul>
Ans.	(d)	
		End of Solution
55.	absorb further moisture, and is define	of airs capacity, at its existing temperature, a
	(a) $\frac{e}{e_s} \times 100$	(b) $\frac{e_s}{e} \times 100$
	(c) $\frac{2e_s}{2} \times 100$	(d) $\frac{2e}{e} \times 100$
	Where: $e$ = Vapour pressure, $e_s$ = Sa	turation vapour pressure
Ans.	(a)	
	Relatively humidity = $\frac{e_a}{e_s} \times 100 \text{ c}$	$r \frac{e}{e_s} \times 100$
	Here, <i>e</i> or $e_a$ = Actual vapour pressure of a $e_s$ = Saturation vapour pressure of a	ure of air in mm of Hg ir in mm of Hg
		End of Solution
36.	Which one of the following is not a m	ajor deterrent in water harvesting through wate
	(a) Deforestation mainly due to popula	ation pressure in the catchments of tank system
	<ul><li>(b) Siltation</li><li>(c) Lack of maintenance and repairs</li></ul>	and breaches of tank embankments
	(d) Shallow depth of water tanks	
Ans.	(d)	
		End of Solution

D/.	Which one of the following	is not a basic requirement for any well screen?
	(a) Resistance to corrosion	n, incrustation and deterioration
	(b) Enough structural stren	igth to prevent collapse
	(c) Suitability for excessive (d) Minimum resistance to	e movement of sand into the well flow of water into the well
٨٥٥		
AII5.	(0)	End of Solution
88.	Which one of the following r surface investigation?	nethods is not the category of Geophysical methods of sub
	(a) Electrical resistivity me	thod (b) Electric logging
	(c) Gamma-ray logging	(d) Electrical response surveying
Ans.	(d)	
	<ul> <li>Electric resistivity methods or the electrical resisti</li> </ul>	od : It is based on the difference in the electrical conductivi vity of different soil.
	Electric logging : This	technique can be used in geotechnical investigations t
	assess the variation w	ith depth of geologic materials and associated fluids.
	<ul> <li>Gamma-Ray logging : radiation to characterize</li> </ul>	This is a method of measuring naturally occurring gamm the rock or sediment in a borehole or drill hole
		End of Solution
89.	In which one of the followir production is very high?	ng industries, the water requirement in kilo litres per unit o
	(a) Paper industry	(b) Steel industry
	(c) Sugar industry	(d) Fertilizer industry
Ans.	(a)	
		End of Solution
90.	In drip irrigation system, wh	nich one of the following emitters is not based on definition ricultural Engineers (ASAE)?
	(a) Emitter	(b) Pulsating emitter
	(c) Long path emitter	(d) Multi-outlet emitter
	(*)	
Ans.		End of Solution
Ans.		
Ans. 91.	A Persian wheel with an ave	erage discharge of 230 litre/minute irrigates 1 hectare whe
Ans. 91.	A Persian wheel with an ave crop in 50 hours. The aver	erage discharge of 230 litre/minute irrigates 1 hectare when age depth of irrigation will be nearly
Ans. 91.	A Persian wheel with an ave crop in 50 hours. The aver (a) 4 cm	erage discharge of 230 litre/minute irrigates 1 hectare when age depth of irrigation will be nearly (b) 5 cm
Ans. 91.	A Persian wheel with an ave crop in 50 hours. The aver (a) 4 cm (c) 6 cm	erage discharge of 230 litre/minute irrigates 1 hectare whe age depth of irrigation will be nearly (b) 5 cm (d) 7 cm
Ans. 91. Ans.	A Persian wheel with an ave crop in 50 hours. The aver (a) 4 cm (c) 6 cm (d)	erage discharge of 230 litre/minute irrigates 1 hectare when age depth of irrigation will be nearly (b) 5 cm (d) 7 cm Discharge × Time



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94.	<ul> <li>Which of the following are the causes of failure of weirs?</li> <li>1. Rupture of floor due to uplift.</li> <li>2. Rupture of floor due to suction caused by standing wave.</li> <li>3. Scour on the upstream and downstream of the weir.</li> <li>(a) 1 and 2 only</li> <li>(b) 1 and 3 only</li> <li>(c) 1, 2 and 3</li> <li>(d) 2 and 3 only</li> </ul>
Ans.	<ul> <li>(c) Rupture of floor due to uplift:</li> <li>If the weight of floor is insufficient to resist the uplift pressure, the floor may burst and fail due to rupture.</li> <li>Rupture of floor due to suction caused by standard wave.</li> <li>The standing wave or hydraulic jump formed at the d/s of the weir causes suction which also acts in the direction of uplift pressure. If floor thickness is insufficient then it may fail due to rupture.</li> <li>Scour on the upstream and downstream of the weir.</li> <li>If the natural water way of a river is contracted, the water may scour the bed both at upstream and downstream of the structure. The scour holes so formed may progress towards the structure causing its failure.</li> </ul>
95.	<ul> <li>Which of the following are the principal factors influencing the choice of a particular method of lining?</li> <li>1. Availability and cost of the material at the site or within easy reach.</li> <li>2. Velocity of flow in the channel.</li> <li>3. Cost of maintenance.</li> <li>(a) 1 and 2 only</li> <li>(b) 1 and 3 only</li> <li>(c) 1, 2 and 3</li> <li>(d) 2 and 3 only</li> </ul>
Ans.	<ul> <li>(c)</li> <li>That type of lining is preferred for which material required is easily available within small distance.</li> <li>If alignment of area if such that slope is very high then velocity of canal will also be high hence in such core stronger material for lining such or concrete lining should be used.</li> <li>To have better benefit - cost ratio that type of lining should be used in which cost of maintenance is less.</li> </ul>
96.	<ul> <li>Which of the following are the objectives for river training?</li> <li>1. High flood discharge may pass safely and quickly through the reach.</li> <li>2. To make the river course stable and reduce bank erosion to minimum.</li> <li>3. To check flow through canal.</li> <li>4. To provide a sufficient draft for navigation as well as good course for it.</li> <li>(a) 1, 2 and 3 only</li> <li>(b) 1, 3 and 4 only</li> <li>(c) 1, 2 and 4 only</li> <li>(d) 2, 3 and 4 only</li> </ul>
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Ans.	<ul> <li>(c)</li> <li>Objectives of river training are high water training : So that high flood discharge may pass safely.</li> <li>Mean water training : To have efficient disposal of sediments.</li> <li>Low water training : To provide sufficient depth of navigation during low weather season.</li> <li>To reduce bank erosion and make the river course stable.</li> </ul>
97.	The transition region between unsaturated zone and saturated zone is called(a) Capillary fringe(b) Water table(c) Yadose water zone(d) Confining bed
Ans.	<ul> <li>(a)</li> <li>Between the unsaturated zone and the saturated zone (water table), transition zone is present called as the capillary fringe.</li> <li>In this zone the voids are saturated or almost saturated with water that is held in place by capillary forces.</li> </ul>
98.	<ul> <li>Which of the following chemical parameters are associated with the organic content of water?</li> <li>1. Biological Oxygen Demand (BOD).</li> <li>2. Chemical Oxygen Demand (COD).</li> <li>3. Total Organic Carbon (TOC) and Total Oxygen Demand (TOD).</li> <li>(a) 1 and 2 only</li> <li>(b) 1 and 3 only</li> <li>(c) 2 and 3 only</li> <li>(d) 1, 2 and 3</li> </ul>
Ans.	(d) End of Solution
99. Ans.	<ul> <li>When chlorine is dissolved in water, it reacts to form hypochlorous acid and hypochlorite ions. At pH &lt; 5, chlorine exists in water as</li> <li>(a) Elemental or molecular chlorine</li> <li>(b) Remains in the form of hypochlorous acid</li> <li>(c) Remains in the form of hypochlorite ions</li> <li>(d) Remains in the form of both hypochlorous acid and hypochlorite ions</li> <li>(a)</li> </ul>
100.	<ul> <li>Reactive substances are</li> <li>(a) Unstable under normal conditions. They can cause explosions and/or liberate toxic fumes, gases, and vapors when mixed with water.</li> <li>(b) Easily ignited and burn vigorously and persistently.</li> <li>(c) Liquids with pH less than 2 or greater than 12.5, the those that are capable of corroding metal containers.</li> </ul>
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	(d) Harmful or fatal when indepted or absorbed			
<b>A</b> no				
-115.	Reactive substance are solids, liquids or gaseous su	ubstances, mixture of substance		
	as well as substances that occur in combinations of with water, at their pressure, temperature or other ch	of such state, which upon conta nemical properties represent a ris		
	or dangerous reaction explosion or emission of dan	End of Solutio		
101.	The noise value of sound waves depends upon:			
	2. The intensity of sound waves.			
	3. The time of exposure of sound waves.			
	(a) 1 and 2 only (b) 1 and 3 (c) 2 and 3 only (d) 1 2 and	only		
<b>A D O</b>		0		
-115.	. (0)	End of Solutio		
102.	. Which one of the following type of treatments will be effluent?	e used for neutralization of alkalir		
	(a) Lime stone treatment (b) Caustic	lime treatment		
	(c) Carbon dioxide treatment (d) Hydroch	nloric acid treatment		
Ans.	. (c)	End of Solutio		
103.	. Flocculation is the process of			
	(a) Gently mixing the water and coagulant allowing floc.	the formation of large particles		
	(b) Removing relatively large floating and suspende	ed debris.		
	<ul><li>(d) Mixture of solids and liquids collected from the disposed of.</li></ul>	e settling tank are dewatered ar		
Ans.	. (a)			
	Flocculation in a process of contact and cohesion whe form larger size clusters in the pressure of coagulation	nereby the particles of a dispersic ants.		
		End of Solutio		
104.	. In solid waste management, waste utilization is ach	nieved by		
	(a) Recover, Reclamation and Reproduce			
	(c) Recover. Recycling and Reproduce			
	(d) Reuse, Reproduce and Recycling			

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Ans.	(*) End of Solution
105.	The frequency range for hearing the sound by a human ear is in the range of(a) 20 Hz - 200 kHz(b) 10 Hz - 20 kHz(c) 20 Hz - 20 kHz(d) 10 Hz - 20 Hz
Ans.	(C) End of Solution
106.	<ul> <li>Physiological response accompanying response and other noise exposures include:</li> <li>A vascular response characteristic by peripheral vasoconstriction, changes in heart beat rate and blood pressure.</li> <li>Various glandular charges such as increased output of adrenaline evidenced by chemical changes in blood.</li> <li>Slow, deep breathing.</li> <li>(a) 1 and 2 only.</li> </ul>
	(c) 2 and 3 only (d) 1, 2 and 3
Ans.	(a)
107.	Electrostatic precipitators are used for removal of <ol> <li>Gaseous contaminants</li> <li>Liquid contaminants</li> <li>Particulate contaminants</li> <li>1 only</li> <li>(b) 2 only</li> <li>(c) 3 only</li> <li>(d) 1, 2 and 3</li> </ol>
Ans.	(c)
108.	Which one of the following type of ecology is dealt with autecology?(a) Synecology(b) Community ecology(c) Ecosystem ecology(d) Individual species ecology
Ans.	(d) End of Solution
109.	A soil sample has porosity of 40%, and the specific gravity of solids is 2.70. If the soil is 50% saturated, the unit weight will be nearly (a) 22 kN/m <sup>3</sup> (b) 20 kN/m <sup>3</sup> (c) 18 kN/m <sup>3</sup> (d) 16 kN/m <sup>3</sup>
A115.	Bulk unit weight, $\gamma_b = \frac{(G + Se)\gamma_w}{1 + e}$
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	$n = \frac{e}{1+e}$ proved	End of Solution
113.	A coarse-grained soil has a void ratio of 0. gradient at which a quick sand condition of (a) 0.62 (b) (c) 0.82 (d)	78 and specific gravity as 2.67. The critical occurs will be 0.74 0.94
Ans.	(d) Critical hydraulic gradient, $i_c = \frac{G-1}{1+e} = \frac{2.67-1}{1+0.78}$ = 0.938	
		End of Solution
114.	<ul> <li>Which of the following assumptions of the F correct?</li> <li>1. The soil mass is semi-infinite, homoge</li> <li>2. The ground surface is a plane which r</li> <li>3. The wall yields about the base and thus sequilibrium.</li> <li>(a) 1 and 2 only</li> <li>(b)</li> <li>(c) 1, 2 and 3</li> <li>(d)</li> </ul>	Rankine theory of lateral earth pressure are neous, dry and cohesionless. may be horizontal or inclined. satisfies the deformation condition for plastic 1 and 3 only 2 and 3 only
Ans.	(c)	End of Solution
115.	The ratio of the horizontal stress to the ve(a) Active earth pressure(b)(c) Earth pressure(d)	rtical stress is called coefficient of Passive earth pressure Plastic earth pressure
Ans.	(c) $\frac{\text{Horizontal stress}}{\text{Vertical stress}} = \frac{\sigma_h}{\sigma_V} = K$	
	K = Earth pressure coefficient.	End of Solution
116.	A bed consists of compressible clay of 4 r impervious rock at the bottom. In a consoli clay from this deposit 90% settlement was mm thick. The time for the building founder settlement will be	n thickness with pervious sand on top and dation test on an undisturbed specimen of reached in 4 hours. The specimen was 20 d over this deposit to reach 90% of its final
	(a) 91 years (b) (c) 73 years (d)	82 years 64 years
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100		and the of fine engine		
120.	<ul> <li>with the passage of direct</li> <li>(a) Electro-osmosis</li> <li>(c) Electro-chemical hard</li> </ul>	ngth of fine graine of current through (b) ening (d)	ed soils can be increased b i them. This process is kno Zeta potential Consolidation	y araining ther wn as
Ans.	(a) Electro-osmosis is a meth is passed through a satur electrode (cathode), pore The cathode is a well por As the water is drained of faster rate than mechanic soil is shear strength is	od of drainage of ated soil between water migrates t int which collects out, the consolida cal consolidation achieved quickly.	cohesive soil in which a dire a positive electrode (anode to cathode. Is the water drained from th tion process can be upto a that is why substantial imp	ect current (DC ) and a negativ e soil. a hundred time rovement in th
101	The combined correction	for our vature and	h refraction for a distance of	E 2400 m will h
121.	nearly (a) 0.2 m	(b)	0.4 m	1 5400 m will c
	(c) 0.6 m	(d)	0.8 m	
Ans.	(d) Combined correction (C)	$= -0.06735d^2$		( <i>d</i> in km
		= -0.0673 × 3.4 <sup>2</sup> = 0.77798 m		
		≈ 0.8 m		
				End of Solution
122.	A 100 m tape is suspend the tape is 30 N, the cor (a) 100.5 m (c) 100.1 m	ed between the e rect distance bet (b) (d)	ends under a pull of 200 N. ween the tape ends will be 100.3 m 99.9 m	If the weight of nearly
Ans.	(d)			
	Sag correction ( $C_s$ )	$= \frac{w^2 l}{24P_m^2}$		
	$C_s$	$=\frac{30^2\times100}{24\times200^2}$		
		$= \frac{30 \times 30 \times 100}{24 \times 200 \times 200}$	9 0.00275 - 0.1 (page	
	Massured length of tapa	$=\frac{100}{24\times2\times2}=\frac{100}{48}$	×2	allve)
	Correct length of tape	= 100 - 0.1 = 99.9 m		
				End of Solution

23.	In horizontal distance measurement, the basic formula for distance in stadia tacheo	me
	has an additive constant. An anallatic lens is inserted in the tacheometer to mak	e t
	additive constant zero. This lens is (a) Convex lens inserted between object class and diaphragm	
	(b) Plano-convex lens between object glass and diaphragm.	
	(c) Plano-convex lens between diaphragm and eye piece.	
	(d) convex lens inserted between diaphragm and eye piece.	
Ans.	(a)	luti
121	If the LMT is $8^{h}$ 12 <sup>m</sup> 16 <sup>s</sup> AM at 38 <sup>s</sup> 45' W longitude, the GMT will be	rutio
127.	(a) $11^{h} 12^{m} 16^{s}$ AM (b) $10^{h} 47^{m} 16^{s}$ AM	
	(c) $9^h 29^m 46^s AM$ (d) $5^h 29^m 46^s AM$	
Ans.	(b)	
	Local mean time at 38°45'W	
	Difference of degree from GMT (0°) longitude	
	= 38° 43′	
	Time difference = $38 \times 4$ minute + $45 \times 4$ seconds	
	= 2 hr. 35 min.	
	Time at GMT = LMT + Time difference	
	= 8 hr. 12 min. 16 sec. + 2 hr. 35 min. - 10 hr. 47 min. 16 sec.	
		Inti
125	A section line AB appears to be 10.16 cm on a photograph for which the focal $L$	enr
120.	is 16 cm. The corresponding line measures 2.54 cm on a map, which is to a	SC
	$\frac{1}{50.000}$ . The terrain has an average elevation of 200 m above mean sea level. The	flyi
	altitude of the aircraft above mean sea level during photograph will be	Ĵ
	(a) 1800 m (b) 2000 m	
	(c) 2200 m (d) 2400 m	
Ans.	(c)	
	= 2.54  cm	
	Scale = $\frac{1}{1}$	
	50,000	
	Actual length on ground = $50000 \times 2.54$ cm	
	Length of same line on photo	
	= 10.16 cm	



	Shift = $\frac{LT^2}{2MR}$ = $\frac{70.41^2}{1000}$ = 0.159 ≈ 0.16 m	
	24×1300 End of Solutio	
128.	A theodolite is called a transit theodolite, when its telescope can be revolved thrug a complete revolution about its (a) Vertical axis in an inclined plane (b) Horizontal axis in an inclined plane (c) Vertical axis in a horizontal plane (d) Horizontal axis in a vertical plane	
Ans.	(d) Transiting = Revolution of telescope about horizontal axis (Trunion axis) in vertical plane.	
	End of Solution	
129.	<ul> <li>Stalactites and stalagmites are features of</li> <li>(a) Stream erosion developed in limestone region by specific chemical reaction.</li> <li>(b) Ground water deposition in caves formed by precipitation from dripping water rice in calcium carbonate.</li> <li>(c) Marine erosion and deposition formed along coastal regions by selective erosice followed by deposition by waves.</li> <li>(d) A centripetal drainage in which streams from different directions flow towards</li> </ul>	
	<ul> <li>(a) Stream erosion developed in intestone region by specific chemical reaction.</li> <li>(b) Ground water deposition in caves formed by precipitation from dripping water rid in calcium carbonate.</li> <li>(c) Marine erosion and deposition formed along coastal regions by selective erosion followed by deposition by waves.</li> <li>(d) A centripetal drainage in which streams from different directions flow towards accommon control basis.</li> </ul>	
Ans.	<ul> <li>(a) Stream erosion developed in intestone region by specific chemical reaction.</li> <li>(b) Ground water deposition in caves formed by precipitation from dripping water rid in calcium carbonate.</li> <li>(c) Marine erosion and deposition formed along coastal regions by selective erosion followed by deposition by waves.</li> <li>(d) A centripetal drainage in which streams from different directions flow towards common central basin.</li> <li>(b)</li> </ul>	
Ans. 130.	<ul> <li>(a) Stream erosion developed in intestone region by specific chemical reaction.</li> <li>(b) Ground water deposition in caves formed by precipitation from dripping water ridin calcium carbonate.</li> <li>(c) Marine erosion and deposition formed along coastal regions by selective erosion followed by deposition by waves.</li> <li>(d) A centripetal drainage in which streams from different directions flow towards common central basin.</li> <li>(b)</li> <li><i>End of Solution</i></li> <li>Which of the following statements with reference to isogonic line are correct in magnetic declination?</li> <li>1. It is drawn through the points of same declination.</li> <li>2. It does not form complete great circle.</li> <li>3. It radiates from north and south magnetic regions and follow irregular paths.</li> <li>(a) 1 and 2 only</li> <li>(b) 1 and 3 only</li> </ul>	
Ans. 130. Ans.	<ul> <li>(a) Stream erosion developed in intestone region by specific chemical reaction.</li> <li>(b) Ground water deposition in caves formed by precipitation from dripping water ridin calcium carbonate.</li> <li>(c) Marine erosion and deposition formed along coastal regions by selective erosion followed by deposition by waves.</li> <li>(d) A centripetal drainage in which streams from different directions flow towards common central basin.</li> <li>(b)</li> <li><i>End of Solution</i></li> <li>Which of the following statements with reference to isogonic line are correct in magnetic declination?</li> <li>1. It is drawn through the points of same declination.</li> <li>2. It does not form complete great circle.</li> <li>3. It radiates from north and south magnetic regions and follow irregular paths.</li> <li>(a) 1 and 2 only</li> <li>(b) 1 and 3 only</li> <li>(c) 2 and 3 only</li> <li>(d) 1, 2 and 3</li> </ul>	
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132.	A little gap is left between the h ice. This gap is known as	ead of the glaciated valley and the mass of the glacie
	(a) Bergs-chrund	(b) Arete
	(c) Horn	(d) Cirque
Ans.	(d)	
		End of Solution
133.	The sight distance available on 1. Features of the road ahead	a road to a driver at any instance depends on
	2. Height of the driver's eye a	bove the road surface
	3. Height of the object above	the road surface
	(a) 1 and 2 only (c) 2 and 3 only	(d) 1, 2 and 3
Ans.	(d)	
		End of Solution
134	Consider the following data	
104.	Design speed = $96 \text{ kmph}$	
	Speed of overtaken vehicle = 8	30 kmph
	Reaction time for overtaking = $2.5 \text{ kmph/sec}$	2 sec
	The safe overtaking sight dista	nce on a two-way traffic road will be nearly
	(a) 646 m	(b) 556 m
	(c) 466 m	(d) 376 m
Ans.	(a)	
	5 = (0.2	$v_B + 6$ = 0.2 × 80 + 6 = 22 m
	$T = \sqrt{\frac{45}{9}}$	$\frac{5}{2} = \sqrt{\frac{4 \times 22}{0.694}} = 11.26 \text{ sec}$
	$V_A = V_C =$	= 96
	$V_B = 80 \text{ k}$	mpn 78 × 80 × 2) + (0.278 × 80 × 11.26 + 2 × 22) +
	(0.2)	78 × 96 × 11.26)
	= 639	m
		End of Solution
135.	Which one of the following state	ements is correct?
	(a) The ratio of load on wheel	to contact area or area of imprint is called as contact
	(b) The ratio of load on wheel	to contact pressure is called as rigidity factor
	(c) The value of rigidity factor is r	more than three for an average tyre pressure of 7 kg/cm <sup>2</sup>
	(d) Rigidity factor does not dep	pend upon the degree of tension developed in walls of
	tures	

Ans.	(a)
136.	Which one of the following is <b>not</b> the correct type of critical load position in pavemer slab design for the load on the pavement surface? (a) Interior loading (b) Edge loading
	(c) Eccentric loading (d) Corner loading
Ans.	(C) End of Solution
137.	Which of the following statements are correct regarding Westergaard's concept for temperature stresses? 1. During the day, the top of the pavement slab gets heated under the sun light whe
	<ul><li>the bottom of the slab becomes hot.</li><li>2. During summer season as the mean temperature of the slab increases, the concret pavement expands towards the expansion joints.</li><li>3. Due to frictional force at the interface, compressive stress is developed at the bottom</li></ul>
	of the slab as it tends to expand.
	(c) 1 and 3 only (d) 1, 2 and 3
Ans.	(b)
138.	End of SolutionWhich of the following advantages are correct regarding Poly-centric shape tunnel?1. It can be conveniently used for road and railway traffic.2. The number of centres and lengths of radii cannot be fixed.3. It can resist external and internal pressure due to its arch action.(a) 1 and 2 only(b) 2 and 3 only(c) 1 and 3 only(d) 1, 2 and 3
Ans.	<ul> <li>(c) Poly-centric Tunnel :</li> <li>This tunnel section consist number of centers.</li> <li>The base of tunnel is flat enough for traffic hence can be used for radius and railway</li> <li>The number of centers and length of roads can be fixed as per the local condition hence required greater skilled persons.</li> <li>The tunnel can resist effectively external and internal pressure.</li> </ul>
	End of Solution
139.	<ul><li>Which one of the following statement is correct regarding Journal friction?</li><li>(a) Caused due to the wave action of rails.</li><li>(b) The amount does not depend upon the type of bearing.</li><li>(c) For roller bearings, it varies from 0.5 to 1.0 kg per tonne.</li></ul>

Ans.	(*) End of Solution
140.	For the construction of a 640 m long B.G. railway track by using a sleeper density of $M + 5$ , and the length of each rail is 12.8 m, the number of sleepers required will b (a) 1000 (b) 900 (c) 800 (d) 700
Ans.	(b)
	Number of sleepers = $\frac{640}{M} \times (M+5)$
	$= \frac{640}{12.8} \times (12.8 + 5)$ = 890 \approx 900
	End of Solution
141.	<ul> <li>Which one of the following statement is correct regarding ballast used for railway tracks</li> <li>(a) The minimum depth of ballast for B.G. section is 20 cm - 25 cm.</li> <li>(b) The quantity of stone ballast required for one metre length of track is 0.53 m<sup>3</sup> for B.G. section.</li> <li>(c) For M.G. section the width of ballast is 1.83 m.</li> <li>(d) The minimum depth of ballast for N.G. section is 10 cm.</li> </ul>
Ans.	(a) Standard depth of ballast for B.G. section is 20 cm - 25 cm.
142.	<ul> <li><i>End of Solution</i></li> <li>Which one of the following statement is correct?</li> <li>(a) The radius of transition raises from infinity to a selected minimum in order to attain full super-elevation and curvature gradually.</li> <li>(b) The compound curve is an arc of circle.</li> <li>(c) The radius of transition curve is constant for entire length.</li> <li>(d) The horizontal curves are provided whenever there is a change in gradient.</li> </ul>
Ans.	(a)
143.	A cross-over occur between two Metre Gauge parallel tracks of same crossing number 1 in 12 with straight intermediate portion between the reverse curves and the distance between the centres of tracks is $3.5 \text{ m}$ . If the value of <i>G</i> is 1 m, the intermediate straight distance will be nearly
	(a) 12 m (b) 15 m (c) 18 m (d) 21 m



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146.	Statement (I) : Pozzolana is added to cement to increase early strength.
	Statement (II) : It reduces the heat of hydration.
Ans.	(d) (i) Initial strength of Pozzolana company is generally loss. So statement is wrong
	(i) Initial strength of 1 02201ana cement is generally less. Oo statement is wrong.
147.	<b>Statement (I) :</b> Coarser the particles, less is optimum moisture content. <b>Statement (II) :</b> The specific surface area of coarser particle is less.
Ans.	(a)
	water required to make the soil grains wet at maximum dry density.
148.	Statement (I) : A reverse curve consists of two arcs with their centres of curvature on opposite sides of the curve.
	Statement (II): Superelevation can be provided conveniently at the intersection point of the two arcs.
Ans.	(c)
149.	<b>Statement (I) :</b> The counter interval depends upon the nature of the ground – whether it is undulating or flat.
	otherwise the contours will come too close for plotting due to the steep slope.
Ans.	(c) Statement II is wrong. Bigger contour interval is adopted in hilly terrain.
	End of Solution
150.	Statement (I): Geodetic survey cannot be done for works requiring high precision. Statement (II): The curvature of earth is accounted for measurements in Geodetic survey.
Ans.	(d) Geodetic survey is done for high precision works.
	End of Solution
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