

Questions & Solutions





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CE-2













4.	For the differential equation				
	$\frac{d^3y}{dx^3} - 5.5 \frac{d^2y}{dx^2} + 9.5$	$5 \frac{dy}{dx} - 5y = 0$			
	We have the solution	$C_1 e^{2.5x} + C_2 e^{\infty x} + C_3 e^{\beta x} \infty, \beta = ?$	МСО		
	(A) –2, –3	(B) 2, 3			
	(C) 1, 2	(D) -1, -2			
Corr	rect Option: C		1 Mark		
5.	Cholesky Decomposit	tion A $\begin{bmatrix} 8 & -5 \\ -5 & a \end{bmatrix}$ l ₂₂ of matrix [L] = 1.9	$968 a_{22} = ?$		
	(A) 11	$\begin{bmatrix} 3 & u_{22} \end{bmatrix}$ (B) 7	MCQ		
	(Γ) 5	(\mathbf{D})			
	(0) 5				
Corr	ect Option: B		2 Mark		
6.	Muller – Breslau prin	ciple is used in analysis of structure fo	or		
	(A) Drawing an ILD fo	or any force response in the structure			
	(B) Writing the virtua	al work expression to get the equilibri	um equation		
	(C) Superposing the l	oad effects to get the total force respo	nse in the structure		
	(D) Relating the defle	ection between two points in a membe	r with the curvature diagram in		
	between		МСQ		
Corr	east Ontion. A	1			
COLL	ect option. A		1 Mark		
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7.	M20 concrete as IS 4	56 : 2000 refers to the concrete with a	design mix.			
	(A) An average cylinder strength of 20 MPa					
	(B) A 5% cylinder stre	ngth of 20 MPa		мсс		
	(C) A 5% cube strengt	h of 20 MPa		MCC	e l	
	(D) An average strengt	h of 20 MPa cube				
Corre	ect Option: C			1 Mar	·k	
0	A - '] '] C -]					
8.	A circular pile of diar	neter 0.6m and length 8 m was constru	cted in a conesive	e soli strat	um	
	having the following	properties $Y_b = 19 \text{ kN/m}^3$, $\phi = 0^\circ$ and	C = 25 kPa. The a	llowable		
	load the pile can carr	y with FOS = 3 is in kN (α = 1.0	NC = 9.0).	NAT		
A						
Answ	ver: 146.87			2 Mar	k	
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9. In the given figure point O indicates the stress point of soil element at initial non-hydrostratic stress condition. For the stress path (OP) which of the following coding condition is correct?



- (A) σ_v is decreasing and 6^{th} is increasing
- (B) σ_v is increasing and 6^{th} is decreasing
- (C) σ_v is constant and 6^{th} is increasing
- (D) σ_v is increasing and 6^{th} is constant

Correct Option: D

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2 Mark

MCO

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(A) No, of lens	(B) longitudinal gradient	15			
(0) 5.1		13			
orrect Option: A, D		1 Mark			
11. Marshall. With i	ncrease in Bitumen content, which are true?				
(A) The air void	(A) The air voids increases initially and then decreases				
(B) The VFB inc	(B) The VFB increases monotonically				
(C) The stability	(C) The stability decreases initially and then decreases				
(D) The flow inc	(D) The flow increases monotonically				
orrect Option: A		1 Marl			
12. There are 4 Red	, 5 Green & 6 Blue balls inside a Box. If N numbe	rs of balls are picked			
Simultaneously	what is smallest N treat guarantees there will at	least 2 balls of same co			
(A) 4	(B) 5	МСО			
(C) 15	(D) 2	мод			
orrect Ontion: A		2 Morth			





16. The theoretical aerobic oxidation of bio mass $(C_5H_7O_2N)$ is given below. $C_5H_5O_2N + 5O_2 \rightarrow 5CO_2 + NH_3 + 2H_2O$. The biochemical oxidation of biomass is assume as first order reaction with a rate constant is 0.23 day at 20°C (base e) neglecting the second stage oxygen demand from its biochemical oxidation the ratio is BOD5 at 20°C to total organic carbon (TOC) is biomass is _____. Atomic weight of CHO as 12g/mol, 1 g/mol, 16g/mol and for N = 14g/mol respectively. NAT

Answer: 1.822 2 Mark 17. In the context of water and waste water treatment the correct statements are (A) Ammonia decreases chlorine demand (B) Phosphorous stimulates algal and aquatic growth. (C) Ca and Mg increases hardness and TDS (D) Particular matter may shield micro-organisms during disinfection. (Correct Option: B, C, D 1 Mark





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	Air pollutant	Health Effect			
	(P) aromatic hydrocarbon	(I) Reduce the capacity of blood to carry oxygen(II) Bronchitis of partonomy(III) Damage of chromosomes			
	(Q) Carbon monoxide				
	(R) Sulphur oxide				
	(S) Ozone	(IV) Carcinogenic effect	MCQ		
	(A) P -IV, Q-I, R-II, S-III	(B) P-IV, Q-I, R-III, S-II			
	(C) P-III, Q-I, R-II, S-IV	(D) P-II, Q-I, R-IV, S-III			
rre 9.	ct Option: A A delivery agent is at a locat	1 tion R. To deliver the order, she is instructed to travel t	l Mar to loc		
rre 9.	ct Option: A A delivery agent is at a locat	1 tion R. To deliver the order, she is instructed to travel t	l Mar to loc		
rre 9.	A delivery agent is at a locat P along the straight line path	1 tion R. To deliver the order, she is instructed to travel t hs of RC, CA, AB & BP of 5 km each the direction of	l Mar to loc P is		
rre 9.	A delivery agent is at a locat P along the straight line path each path is given in the tabl	tion R. To deliver the order, she is instructed to travel t hs of RC, CA, AB & BP of 5 km each the direction of le below as WCB. Assume latitude L & departure D of F 2 in km2	l Mar to loc R is		
rre 9.	A delivery agent is at a locat P along the straight line path each path is given in the tabl (0, 0) km. What is L & D of P	tion R. To deliver the order, she is instructed to travel t hs of RC, CA, AB & BP of 5 km each the direction of le below as WCB. Assume latitude L & departure D of F P in km?	l Mar to loc R is		
rre 9.	A delivery agent is at a locat P along the straight line path each path is given in the tab (0, 0) km. What is L & D of P Path RC CA AB	tion R. To deliver the order, she is instructed to travel t hs of RC, CA, AB & BP of 5 km each the direction of le below as WCB. Assume latitude L & departure D of F in km? BP	l Mar to loc R is		
гге 9.	A delivery agent is at a locat P along the straight line path each path is given in the tab (0, 0) km. What is L & D of P Path RC CA AB Direction 120 0 90	tion R. To deliver the order, she is instructed to travel the of RC, CA, AB & BP of 5 km each the direction of le below as WCB. Assume latitude L & departure D of P in km?	l Mar to loc R is MCQ		
гге 9.	A delivery agent is at a locatP along the straight line patheach path is given in the tab $(0, 0)$ km. What is L & D of PPathRCCAABDirection1200 (A) L = 0.0, D = 5.0	tion R. To deliver the order, she is instructed to travel the of RC, CA, AB & BP of 5 km each the direction of le below as WCB. Assume latitude L & departure D of FP in km? BP 240 (B) $L = 0.0, D = 0.0$	l Mar to loc R is MCQ		

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Elevation temp [⁰C] 20. 5m 14.2 NAT 325 m 16.9 C^0 Lapse rate = _____ 100M Answer: 0.84375 1 Mark 21. Match the following Ι Π P. Horton's equation i. precipitation Q. Musking um euquation ii. flood frequency R. Pen man equation iii. evaporation iv. Infiltration v. Channel Routing MCQ (A) p-iv, q-v, r -iii (B) p-iii, q-v, r -ii (C) p-iv, q-iii, r -ii (D) p-i, q-ii, r -iii **Correct Option: A** 1 Mark

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1 Mark

24. The critical flow condition in a channel is given by a = kinetic energy correction factor

(A)
$$\frac{\alpha \theta^2}{g} = \frac{A_{c^3}}{T_c}$$
 (B) $\frac{\alpha \theta}{g} = \frac{A_{c^3}}{T_c}$ MCQ
(C) $\frac{\alpha \theta}{g} = \frac{A_{c^3}}{T_{c^2}}$ (D) $\frac{\alpha \theta^2}{g} = \frac{A_{c^3}}{T_c}$

Correct Option: *

25. A circle radius 30 km, 5 rain gauges

Gauge	G1	G ₂	G ₃	G4	G5
Rain fall (mm)	910	930	925	985	905



Using Thiessen polygon method, what is the average rainfall over the catchment in that year?

