GATE 2023

Civil Engineering

Questions & Solutions

12th Feb Forenoon Session

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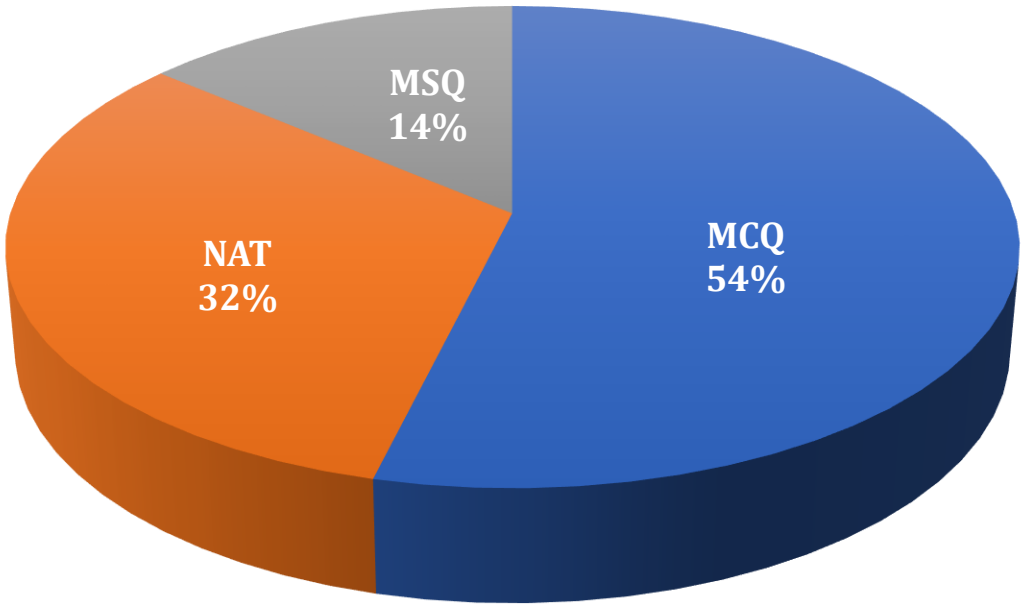
GATE 2023 Paper Analysis

Memory Based

Types of Questions



SECTION - A GENERAL APTITUDE

1. Eject : Insert : : Advance : _____

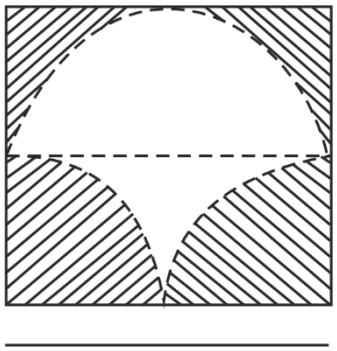
MCQ

(A) Retreat (B) Loan

(C) Advert (D) Progress

Correct Option: D **2 Mark**

2. Find the area of shaded region (square of 4cm)?



MCQ

(A) 8 (B) 10

(C) 4 (D) 12

Correct Option: A **2 Mark**

3. Disease by viral pathogens (waterborne)?

MCQ

(A) Hepatitis (B) Cholera

(C) Typhoid (D) Acute anterior poliomyelitis

Correct Option: A **1 Mark**

4. If a = 30!, b = 50!, c = 100! Then arrange $\log_a c$, $\log_c a$, $\log_b a$, $\log_a b$

MCQ

(A) $\log_c a < \log_b a < \log_a c < \log_a b$ (B) $\log_c a < \log_b a < \log_a b < \log_a c$

(C) $\log_b a < \log_c a < \log_a b < \log_a c$ (D) $\log_c a < \log_a b < \log_b a < \log_b c$

Correct Option: B **2 Mark**

5. I have not decided yet, what I will do this evening, I ___ visit a friend.

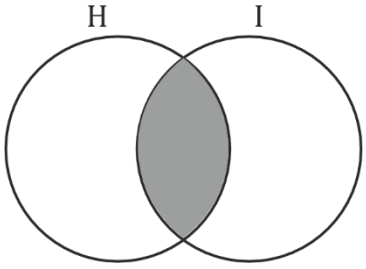
MCQ

(A) might (B) mite

(C) did not (D) will

Correct Option: B **2 Mark**

6. Based only on Truth of statement given, "Some Humans are Intelligent" logical conclusion?



(A) No Human is Intelligent

(B) Some Intelligent beings are human

MCQ

(C) All Human are Intelligent

(D) Intelligent are non-human

Correct Option: B **2 Mark**

7. A Duck named "Donald Duck" says "All Ducks Lie"

(A) Donald Duck statement is true

(B) Donald Duck always tells Truth

(C) Donald Duck always Lie

(D) Donald Duck statement is False.

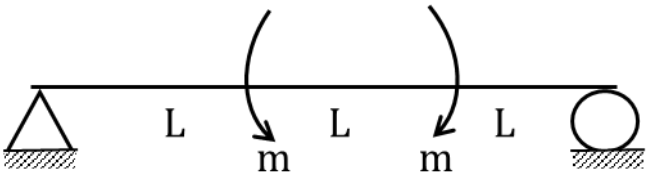
MCQ

Correct Option: D

1 Mark

SECTION - B TECHNICAL

1. Which of the following is correct for a given beam?



MSQ

(A) SF is zero everywhere

(B) BM is zero every where

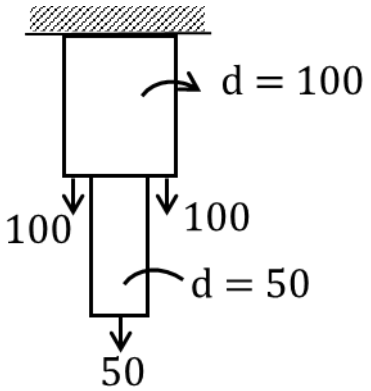
(C) Support Reaction is zero

(D) Defection is zero every where

Correct Option: A, C

2 Mark

2. Find the maximum tensile stress?

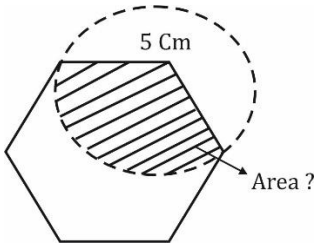


NAT

Answer: 25 MPa

1 Mark

3. Find the area of shaded region (Regular Hexagon)?



NAT

Answer: 25π

2 Mark

4. Solve the integral $\int_{-1}^{1} \frac{1}{x^2} dx = ?$

(A) $I = -2$
(B) $I = 2$
(C) $I = 0$
(D) does not exit

MCQ

Correct Option: D

2 Mark

5. If $[A] = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \end{bmatrix}$ which of the following is true?

(A) Eigen values of A^T are same as of A
(B) Eigen values of A^{-1} are same as of A
(C) Eigen values of A^T are same as of vector A
(D) Eigen values of A^{-1} are same as of vector A

MSQ

Correct Option: A, B, C

2 Mark

6. Probability event A is 0.5 & that of B is 0.8. The probability of at least one of them will be _____ (A & B are independent event). **NAT**

Answer: 0.9 **1 Mark**

7. $f(x) = e^x |\sin x|$ correct ? **MSQ**

(A) Continuous (B) Periodic

(C) Differentiable (D) Bounded

Correct Option: A, C **1 Mark**

8. Which of the following matrix will have non negative Eigen value? **MCQ**

(A) M^2 (B) MM^T

(C) M^{-1} (D) M^TM

Where M is n x n matrix

Correct Option: A **1 Mark**

9. Infiltration $f_i = 10$ mm/h, $f_c = 5$ mm /h, $k = 0.5$/h **NAT**

Total Infiltration in 12 hour.

Answer: 70 mm **1 Mark**

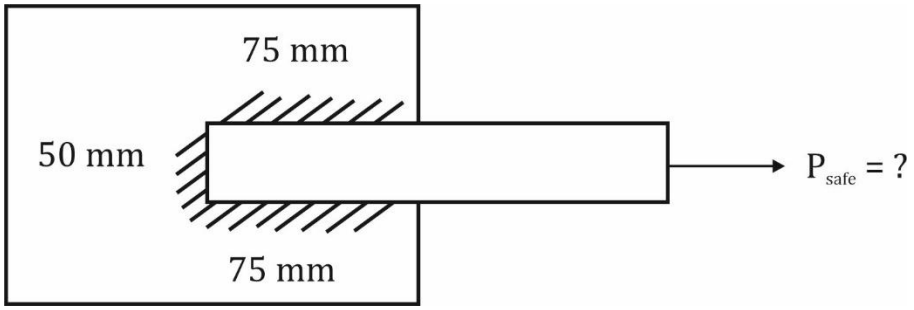
10. Waste water inflow in ASP = 0.5 m^3/sec. & $\frac{F}{m}$ ratio = 0.20 mg/mg day influent Biodegradable organic matter [After primary setting] is 150 mg/L, MLVSS = 2000 mg/L. Complete removal of biodegradable organic matter. Find the volume of aeration tank is _____ m^3

NAT

Answer: 16200

2 Mark

11. Size = 8 mm, σ_{perm} = 120 MPa



NAT

Answer: 134.4

1 Mark

12. When a super critical flow enters mild channel flow profile

(A) M_1 (B) M_2

(C) M_3 (D) M_1& M_2

MCQ

Correct Option: C

1 Mark

13. A hydraulic jump occurs in a from wide horizontal, friction less, rectangular a channel, with a presume depth of 0.2 m and part-jump depth of 1.0 m. The value of g may be taken of 10 m/s^2. The values of SP. Force at the pre jump and post jump section are same and are equal to____ (in m^3)

NAT

Answer: 0.62

2 Mark

14. In a single reinforced beam having a concrete of M20 and steel as Fe415. The value of maximum compressive strain in concrete and maximum tensile strain in steel is _____

(A) 0.0035 & 0.0046
(B) 0.0035 & 0.0038
(C) 0.0035 & 0.002
(D) 0.002 & 0.0035

MCQ

Correct option: B

2 Mark

15. Direct and reserved zenith angle by theodolite are 56^0& 303^0. Find vertical collimation Error?

(A) $-0^0 30'$
(B) -1^0
(C) $+0^0 30'$
(D) $+1^0$

MCQ

Correct Option: D

1 Mark

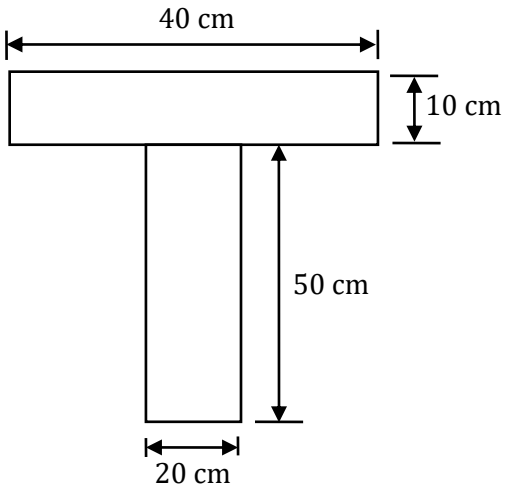
16. From two instrument station A and B, reading well taken at the top of a Hill at an inclination of 12°45′ and 18⁰45’ respectively. From station A, Back sight reading was taken 2.340 m at B.M of R.L 100.00 m. Distance between A and B is 55 m. Find the R.L. of top point of Hill?

NAT

Correct Option: 137.4 m

2 Mark

17. Find the moment of inertia about centroidal axis is _____ cm^4

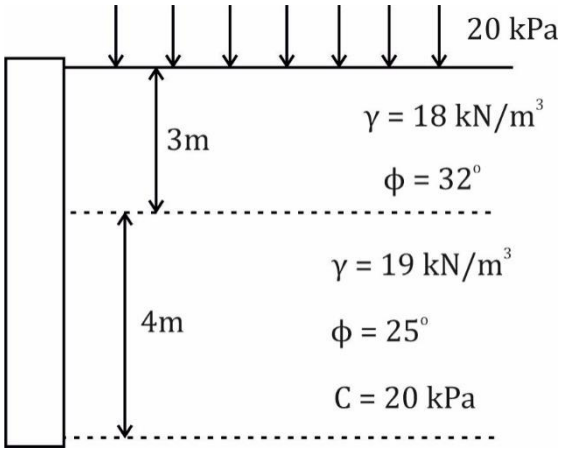


NAT

Answer: 468809.5237

2 Mark

18. Find the active pressure at base is _____



NAT

Answer: 35.42 KPa

2 Mark

19. For a soil the following properties are given as
specific gravity G = 2.6, degree of saturation, S = 50%, water content, w= 15%.
Find the value of void ratio?

NAT

Answer: 0.78

1 Mark

20. With reference to compaction curve, which of the following statement is incorrect?
(A) Compaction curve crosses zero air voids line
(B) Compactive effort increases OCM decreases
(C) Peak point Compactive curve given γ_{dmax} and OMC
(D) Compactive effort increases γ_{dmax} increases

MCQ

Correct Option: A

1 Mark

21. A drained shear test cored on sandy soil. Under a normal stress of 50 KPa. The specimen failed at 35 KPa. Find the angle of function.

NAT

Answer: 35

1 Mark

22. $|G_1| < |G_2|$ and $G_1 \neq G_2 \neq 0$

(i) $+G_1, +G_2 \rightarrow$ Make sag vertical curve

(ii) $-G_1, -G_2 \rightarrow$ Make sag vertical curve

(iii) $+G_1, -G_2 \rightarrow$ Make crest vertical curve

MCQ

(A) (i), (ii) and (iii)
(B) (i), (iii) and (ii)
(C) (i) and (iii)
(D) (ii) and (iii)

Correct Option: C

1 Mark

23. For a horizontal curve, radius of curve is 300 m, with design speed of 15 m/s. When the jerk is 0.75. Length of transition curve _____.

MCQ

Answer: 15

1 Mark

24. Which of the following is true about RDF (Refuse derived fuel)?

(A) RDF can be in powdered form

(B) HHV (High heat value) of unprocessed MSW is lesser than HHV of RDF

(C) RDF can't be used in conjunction with oil

(D) Inorganic fraction of MSW is mostly converted to RDF

MSQ

Correct Option: A, B

2 Mark

25. $F(x) = px4 + qx5$

Fourier series $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty}\left(b_n \cos\left(\frac{n\pi x}{L}\right) + a_n \sin\left(\frac{m}{L}\right)\right)$

(A) a_n depends on p

(B) a_n depends on q

(C) b_n depends on p

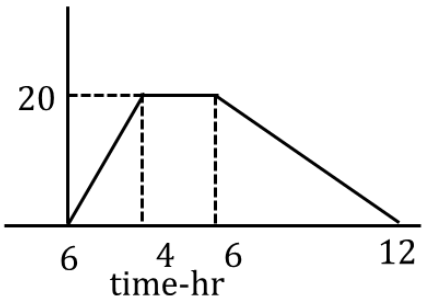
(D) b_n depends on q

MSQ

Correct Option: B, C

2 Mark

26. A 12 hr storm occurs over a catchment and result in direct runoff depth 100 mm. the time distribution of rainfall intensity is shown in fig (not to scale). The φ index of the storm is (in mm, round off to two decimal places)_____

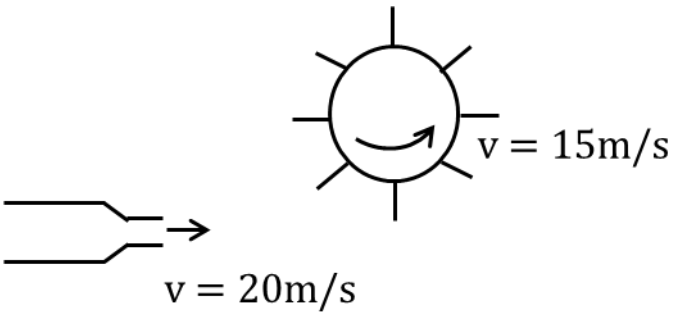


NAT

Answer: 3.33

2 Mark

27. Find the Efficiency η is _____



MCQ

(A) 66.66%
(B) 88.9%
(C) 50.1
(D) 37.5

Correct Option: D

2 Mark

28. A canal is used to irrigate area of 1000 ha for growing wheat. The time between first and last watering is 120 days, depth of water required is 35cm. more intense watering is required for 30 days and depth of water required is 12cm. Neglecting all other losses, calculate the minimum discharge required in the canal in m^3/sec.

NAT

Answer: 0.0346

1 Mark

29. The ordinates of a one hour unit hydrograph for a catchment are given below

t(hr)	0	1	2	3	4	5	6	7
$\theta(m^3/sec)$	0	9	21	18	12	5	2	0

Using the principle of superposition a D-hr UH for a catchment was derived from the One-low UH. The ordinate of the P hr UH where obtained as 3 m^3/sec at t = 1 hr and 10m^3/s at t = 2 hr the value of 'D' (integer) is _____

NAT

Answer: 10

2 Mark