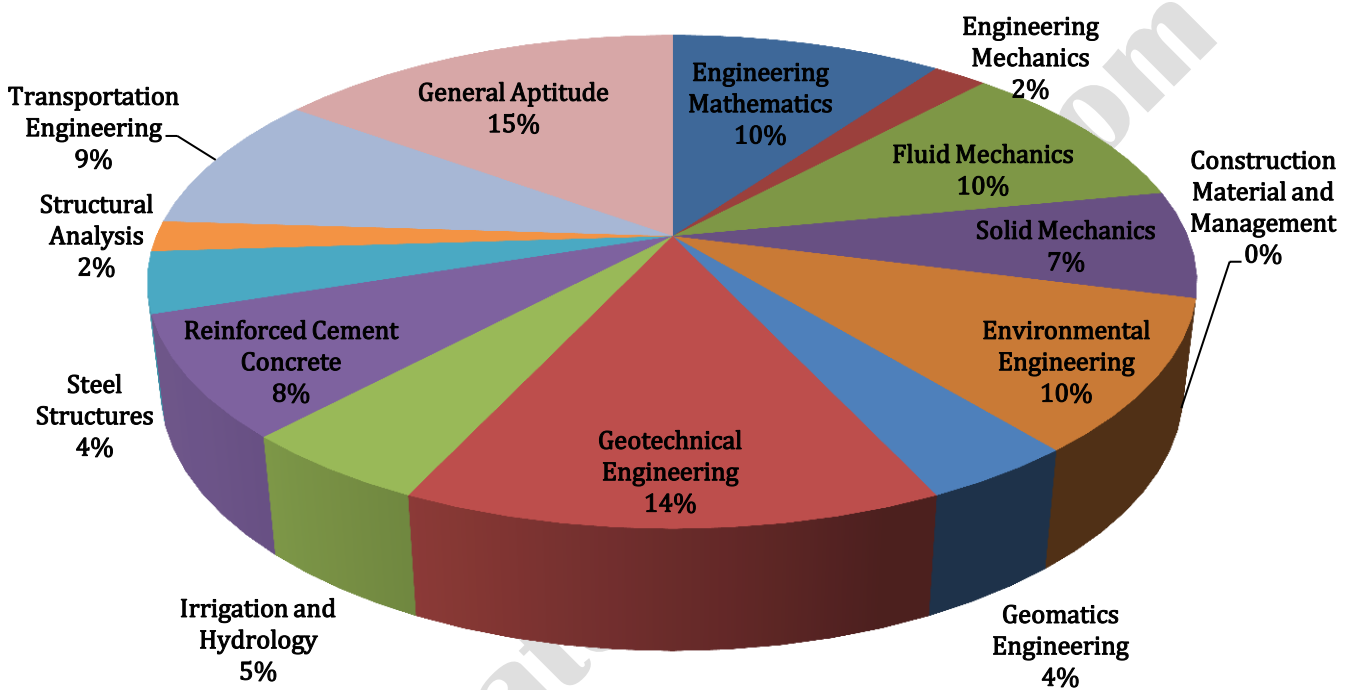


ANALYSIS OF GATE 2018* (Memory Based)

Civil Engineering



CE ANALYSIS-2018_11-Feb_Morning

SUBJECT	No. of Ques.	Topics Asked in Paper(Memory Based)	Level of Ques.	Total Marks
Engineering Mathematics	1 Marks: 4 2 Marks: 3	Matrix Methods; Maxima and Minima	Tough	10
Engineering Mechanics	1 Marks: 0 2 Marks: 1	Trusses and Frames	Medium	2
Fluid Mechanics	1 Marks: 4 2 Marks: 3	Fluid Properties; Fluid Statics; Boundary Layer; Flow through pipes; Hydraulic Machines; Open Channel Flow	Tough/Easy	10
Solid Mechanics	1 Marks: 1 2 Marks: 3	Simple Stress and Strain; Shear Force and Bending Moment; Stresses in Beams Deflection of Beams;	Medium	7
Construction Material and Management	1 Marks:0 2 Marks: 0	-	-	-
Environmental Engineering	1 Marks: 2 2 Marks: 4	Solid Waste Management; Air Pollution; BOD; Rapid Sand Filter	Medium	10
Geomatics Engineering	1 Marks: 0 2 Marks: 2	Theodolite and Traversing; Leveling;	Easy	4
Geotechnical Engineering	1 Marks: 4 2 Marks: 5	Soil Classification; Effective Stress; Consolidation; Permeability and Seepage; Shear Strength; Foundation Engineering (Shallow and Deep)	Medium	14
Irrigation and Hydrology	1 Marks: 1 2 Marks: 2	Irrigation; Hydrology	Medium/Easy	5
Reinforced Cement Concrete	1 Marks: 4 2 Marks: 2	Limit State of Collapse; Shear; Compression Concrete Technology	Medium	8
Steel Structures	1 Marks: 2 2 Marks: 1	Welding Connection & Plastic Analysis	Medium	4
Structural Analysis	1 Marks: 0 2 Marks: 1	Deflection Of Truss; Slope And Deflection Of Structure	Medium	2
Transportation Engineering	1 Marks: 3 2 Marks: 3	Traffic Engineering; Highway Material; Geometric Design; Airport Engineering	Medium/Easy	9
General Aptitude	1 Marks: 5 2 Marks: 5	Equations, Geometry, Vocabulary, Functions	Tough	15
Total	65			100
Faculty Feedback	Majority of the question were concept based. General Aptitude And Mathematics is tough. Core Subject Questions were 50% Medium, 30% tough and 20% easy.			

GATE 2018 Examination*

Civil Engineering

Test Date: 11/02/2018

Test Time: 9:00 AM 12:00 PM

Subject Name: Civil Engineering

General Aptitude

Q.1 - Q.5 Carry One Mark each.

1. Tower A = 90 m tall, Tower B = 140 m tall. They are 100 m apart. A horizontal skywalk connects the floors at 70 m in both the towers. If a tent rope connects the top of Tower A, to the bottom of Tower B, at what distance (m) from Tower A will the rope intersect the skywalk?

[Ans. 22.22 m]

2. Hema's age is 5 years more than twice of Hari's age. Suresh age is 13 years less than 10 times Hari's age. If Suresh is 3 times as old as Hema, how old is Hema?

(A) 14 (B) 17
(C) 18 (D) 19

[Ans. D]

3. The driver applied the _____ as soon as she approached the hotel where she wanted to take a _____?

(A) Brake, Break (B) Break, Break
(C) Brake, Brake (D) Break, Brake

[Ans. A]

4. It is no surprise that every society has had codes of behavior; however the nature of these codes is often _____?

(A) Unpredictable (B) Simple
(C) Expected (D) Strict

[Ans. A]

5. The temperature T in a room varies as a function of the outside temperature T_0 and the number of persons in the room p , according to the relation $T = k(\theta p + T_0)$ where θ , $k =$ constant. What would be the value of θ which gives the following data?

T_0	p	T
25	2	32.4
30	5	42

(A) 0.8 (B) 1.0
(C) 2.0 (D) 10.0

[Ans. B]

Q.6 - Q.10 Carry Two Mark each.

6. If $a_n = \frac{1}{n} - \frac{1}{n+2}$ where n is an integer ($n > 0$), the sum of first 50 numbers is _____?

- (A) $\left(1 + \frac{1}{2}\right) - \frac{1}{50}$ (B) $\left(1 + \frac{1}{2}\right) + \frac{1}{50}$
(C) $\left(1 + \frac{1}{2}\right) - \left(\frac{1}{51} + \frac{1}{52}\right)$ (D) $1 - \left(\frac{1}{51} + \frac{1}{52}\right)$

[Ans. C]

7. If A, B, C, D, E, F, G are unique numbers from 1 to 9 and in such a manner that $A \times B \times C = D \times E \times F = B \times G \times E$

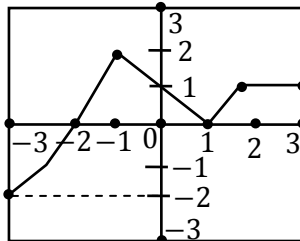
A		D
B	G	E
C		F

Then A, B, C, D, E, F, G cannot be

- (A) 4 (B) 5
(C) 6 (D) 9

[Ans. B]

8. Which of the following functions is correct for the given graph in the given ranges?



- (i) $y = 2x + 4$ for $-3 \leq x \leq -1$
(ii) $y = |x - 1|$ for $-1 \leq x \leq 2$
(iii) $y = ||x| - 1|$ for $-1 \leq x \leq 2$
(iv) $y = 1$ for $2 \leq x \leq 3$
(A) (i), (ii), (iii) (B) (i), (ii), (iv)
(C) (i) and (iv) (D) (ii) and (iv)

[Ans. B]

9. A fruit seller sold a basket of fruits at 12.5% loss. Had he sold it for Rs.108 more, he would have made a 10% gain. What is the loss in Rs. income by the seller?

- (A) 48 (B) 52
(C) 60 (D) 108

[Ans. C]

10. The price of a wire made of a super alloy material is proportional to the square of its length. The price of 10 m length wire is 1600. What would be the total price of two wires of lengths 4m and 6m?

- (A) 768 (B) 832
(C) 1440 (D) 1600

[Ans. B]

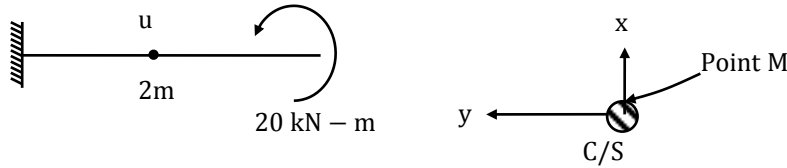
Technical

- RG 1 2 3 4 5 6
RD(mm) 470 465 435 525 480 610
Area of The section (10^4 m^2) 95 100 98 80 85 92 Thiessen mean value in mm _____
[Ans. *] Will update soon
- In a L_a b, flow expression is performed over a hydro value struct . measured $Q = 0.05 \text{ M}^3/\text{s}$ $V = 0.25 \text{ M/s}$ full scale strut (30 times bigger) is subjected to discharge of 270 m^3 then time scale model to full scale value is _____
[Ans. *] Will update soon
- The ultimate BOD of a wastewater sample is estimated as 87% of COD. COD is 300 Mg/L . $k = 0.23 \text{ day}^{-1}$, temp coefficient = 1.047. Calculate $\text{BOD}_3 @ 27^\circ\text{C}$
[Ans. 160.16 mg/L]
- In a city there are 20000 vehicles and each vehicle trowels a distance of 12000 km. The No_x produced is 2g/km . The total amount of No_x produced in kgs is
[Ans. 4,80,000 kg]
- Given orthogonal matrix

$$Q = \begin{bmatrix} \frac{3}{7} & \frac{2}{7} & \frac{6}{7} \\ -\frac{6}{7} & \frac{3}{7} & \frac{2}{7} \\ \frac{2}{7} & \frac{6}{7} & -\frac{3}{7} \end{bmatrix}$$
The inverse is =?
[Ans. *] Will update soon
- At the point $x=0$, the function $f(x) = x^3$ has
(A) Local maximum
(B) Local minimum
(C) Both local maximum and minimum
(D) Neither local maximum and local minimum
[Ans. *] Will update soon
- Which of the following matrix is singular =?
 $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$ $\begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$ $\begin{bmatrix} 4 & 3 \\ 6 & 2 \end{bmatrix}$
[Ans. *] Will update soon
- The solution at $x=1$ of the differential equation $\frac{d^2y}{dx^2} + 2 \cdot \frac{dy}{dx} + y = 0$ subjected to boundary condition $y(0) = 1, \frac{dy}{dx}(0) = -1$ is _____?
[Ans. *] Will update soon

9. The solution at $x=1, t=1$ of the partial differential equation, $\frac{\partial^2 u}{\partial x^2} = 25 \frac{\partial^2 u}{\partial t^2}$ subjected to initial condition $u(0) = 3x, \frac{\partial u}{\partial t}(0) = 3$ is _____
- (A) 1 (B) 2
(C) 4 (D) 6
- [Ans. *] Will update soon**
10. The value of the integral $\int_0^n x \cos^2 x. dx$ is = ?
- (A) $n^2/8$ (B) $n^2/4$
(C) $n^2/2$ (D) n^2
- [Ans. *] Will update soon**
11. A 1:50 model of a spillway is to be tested in lab. The discharge in prototype Spillway = $1000 \text{ m}^3/\text{sec}$. The corresponding discharge to be maintained in the model?
- [Ans. *] Will update soon**
12. A 10 m wide rectangular channel carries a discharge of $20 \text{ m}^3/\text{sec}$ under critical condition using $g = 9.81 \text{ m/s}^2$. Specific energy (in m) _____?
- [Ans. *] Will update soon**
13. Bernoulli's equation is applicable for
- (A) Viscous and compressible fluid flow
(B) In-viscous and compressible fluid flow
(C) In -viscous and in-compressible fluid flow
(D) Viscous and incompressible fluid flow
- [Ans. *] Will update soon**
14. A flow field is given by $u = y^2, v = -xy, w = 0$. Value of the z-component of angular velocity (in radian per unit time) at the point $(0, -1, 1)$ _____?
- [Ans. *] Will update soon**
15. In a lab, a flow experiment is performed over a hydraulic string. The measured values of discharge and velocity are $0.05 \text{ m}^3/\text{sec}$ and 0.25 m/sec . If the full scale string (30 times bigger) is subjected to a discharge of $270 \text{ m}^3/\text{sec}$, then the time scale (model to full scale) value is _____?
- [Ans. *] Will update soon**
16. A closed tank contains 0.5 m thick layer of mercury (Special gravity=13.6) at bottom. A 20 m thick layer of water lies above the mercury layer. A 30 m thick layer of oil (Special gravity=0.6) lies above the water layer. The space above the oil layer contains air pressure. The gauge pressure at the bottom of tank is 196.2 kN/m^2 . The density of water = 1000 kg/m^3 and $g = 9.81 \text{ m/s}^2$. The value of pressure in the air space?
- (A) 92.21 N/m^2 (B) 95.644 N/m^2
(C) 98.922 N/m^2 (D) 99.321 N/m^2
- [Ans. *] Will update soon**

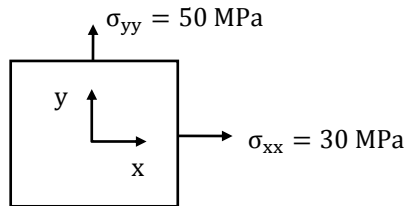
17. A solid circular beam with radius of 0.25 m and length of 2m is subjected to a twisting moment of 20 kN-m, about z-axis .The shear stress component τ_{xy} at point 'M' in C/S of the beam at a distance of 1m from fixed end=?



- (A) 0
(B) 0.51
(C) 0.815
(D) 2

[Ans. *] Will update soon

18. $y = 2 \times 10^{11} \frac{N}{m^2}, \mu = 0.3$
if σ_{zz} is negligibly small and assumed to be zero, then strain $\epsilon_{zz} = ?$



- (A) -120×10^{-6}
(B) -60×10^{-6}
(C) 0
(D) 120×10^{-6}

[Ans. *] Will update soon

19. In fillet weld, the direct shear stress and bending tensile stress =50 and 150 MPa. As per IS 800:2007.equivalent stress=?

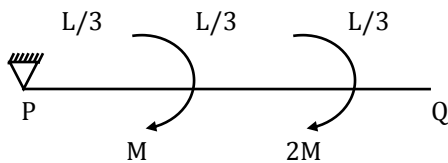
[Ans. 173.2 MPa]

20. A column of height 'h' with rec C/S of 2×2 has buckling load P. If C/S change to 0.5 a and height 1.5 h, then buckling load of

$$\frac{P}{12}, \frac{P}{4}, \frac{P}{2}, \frac{3P}{4}?$$

[Ans. *] Will update soon

21. SSB, uniform EI, slope at P



- (A) 0
(B) $\frac{ML}{9EI}$
(C) $\frac{ML}{6EI}$
(D) $\frac{ML}{3EI}$

[Ans. *] Will update soon

22. Variation of water depth (y) in G.V O.C.F is given by first order differential equation/

$$\frac{dy}{dx} = \frac{1 - e^{\frac{10}{3} \ln(y)}}{250 - 45 e^{-31 \ln(y)}}.$$

Given initial conditions, $y(x=0)$, 0.8 the depth in m of flow at downstream section at $x=1$ m from one. Calculation step of single step Euler method is

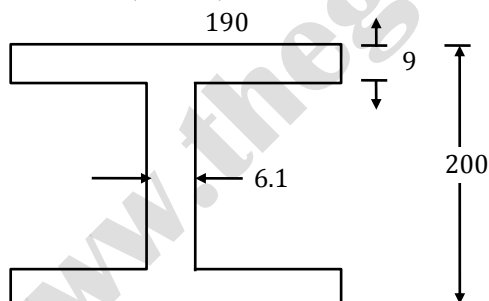
[Ans. *] Will update soon

23. A cantilever beam of 2m with square section of side length 0.1 m, is loaded vertically at free end=5 mm. The beam is made of steel $\gamma = 2 \times 10^{11}$ N/m². The maximum bending stress=?

- (A) 20
(B) 37.5
(C) 60
(D) 75

[Ans. *] Will update soon

24. The dimensions of a symmetrical welded I-section are shown in figure plastic section modulus (in cm³) about weaker axis?



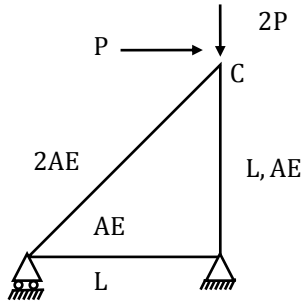
[Ans. *] Will update soon

25. $E = 2 \times 10^{11} \text{ N/m}^2$

$A = 10 \text{ mm}^2$

$L=1\text{m}, P=1\text{kN}$

Horizontal displacement at e(mm)=?



[Ans. *] Will update soon

26. The width of a square footing is equal to the diameter of a circular footing. If both the footings are resting on sandy surface. Find the ratio of the ultimate bearing capacity of circular footing to ultimate bearing capacity of square footing?

(A) $4/3$

(B) 1

(C) $3/4$

(D) $2/3$

[Ans. C]

27. In a shrinkage limit test the mass and volume of the dry soil were found as 88 g and 50 cm^3 respectively density of water is 1 g/cc. the specific gravity of soil solids is . The shrinkage limit of the given soil sample is_____?

[Ans. 19.92 %]

28. A core cutter is having outer and inner diameter as 160 mm and 100 mm respectively. The area ratio (in % upto two decimal places) is _____

[Ans. 12.36 %]

29. A steel column of ISHB 350 @ 72.4 kg/m is subjected to a factored axial compression load of 2000 kN. The load is transferred to a concrete pedestal of grade M20 through square base plate. The bearing strength of the concrete is $0.45 f_{ck}$. The length of the side of base plate required is _____?

[Ans. 48 cm]

30. A city generates 40×10^6 MSW out of which 10% recyclable and 90% goes to landfill. The density of MSW is 550 kg/m^3 . The height of lift is 3m. 80% of landfill is occupied by MSW. The surface area of landfill is _____

[Ans. *] Will update soon

31. A RSF treats 99MLD of water. 5% of water is required for back washing . The ROF is 6 m/hr. Length to width ratio is 1.35. the width of filter, is limited to 5.2m. An extra filter has to be provided in case of a break down .Total number of filters required are
- (A) 19 (B) 20
(C) 21 (D) 22

[Ans. C]

32. Calculate the carbonate hardness of the following water sample

	Conc	At.wt
Ca ^{2t}	60	40
Mg ^{2t}	30	24 – 31
Hco ₃ ⁻	400	61

[Ans. *]Range: 272 to 274

33. A RCC short column of cross-sectional dimensions 250 × 350 is provided with 4 reinforcement bars of 16 mm diameter. The grade of steel and concrete are Fe415 and M20 respectively. Neglect eccentricity effect. Find the axial load carrying capacity of the column in kN.

[Ans. 918 kN]

34. The deformation in concrete due to sustained loading is
- (A) Creep (B) Hydration
(C) Segregation (D) Shrinkage

[Ans. A]

35. "If $y(x) = x^3$ then at $x=0$ function has
- (A) Minimum value (B) Maximum value
(C) Both minimum and maximum (D) Neither minimum nor maximum

[Ans. D]

36. Calculate the number of standard axles (msa) for a highway having a design life of 15 years, rate of growth of traffic as 6% , vehicle damage factor =4, lane distribution factor=0.75. The existing traffic is 3000 veh/day

[Ans. 76.46 msa]

37. Aircraft approaches the threshold of a runway strip at a speed of 200 Kmph. the deceleration is 1.637 m/s² and it takes 18 sec to exit runway strip. If deceleration after exiting the runway is 1 m/s², the distance of gate position from location of exit on runway is _____

[Ans. *] will updated soon

More Questions Update Soon