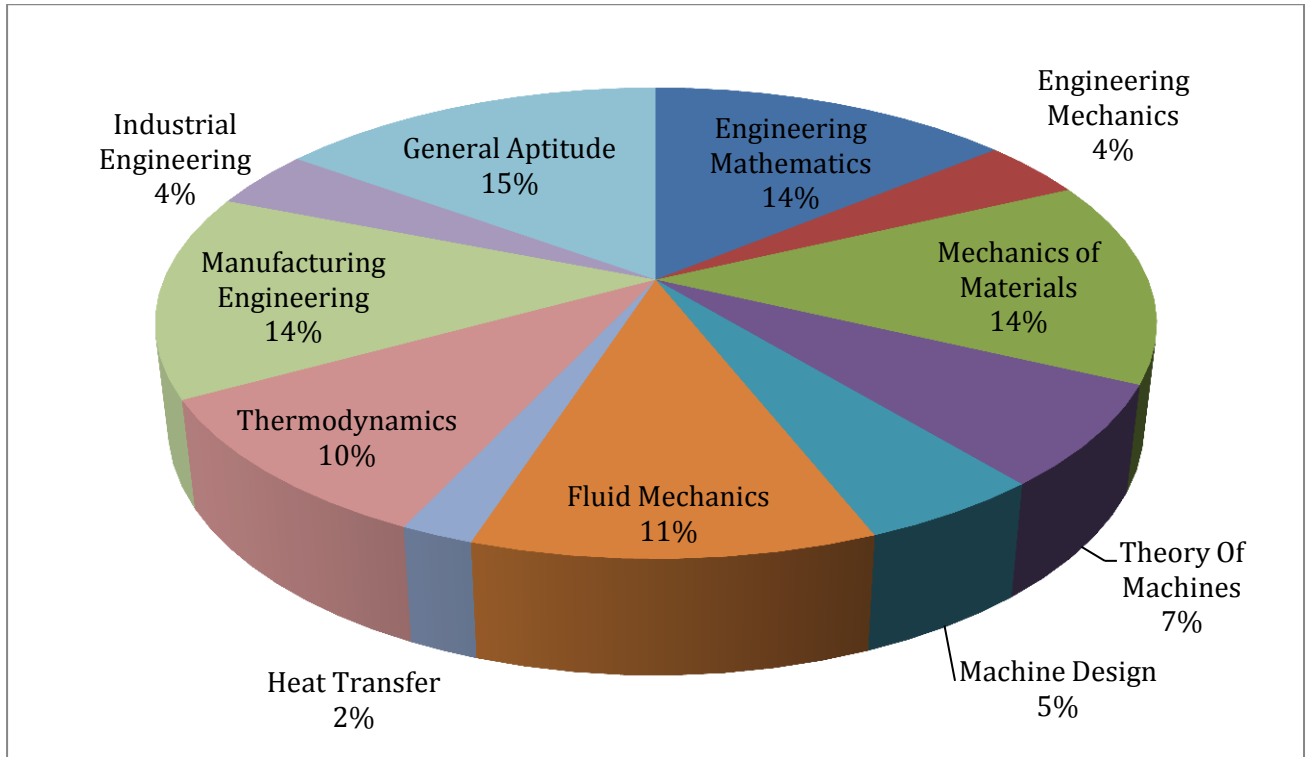


## ANALYSIS OF GATE 2018\*(Memory Based)

### Mechanical Engineering



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**ME ANALYSIS-2018\_3-Feb\_Morning**

SUBJECT	No. of Ques.	Topics Asked in Paper(Memory Based)	Level of Ques.	Total Marks
Engineering Mathematics	1 Marks: 6 2 Marks: 4	Mean Value Theorem; Probability , Euler's Method, Rank, Analytic Function, Laplace Transform	Easy	14
Engineering Mechanics	1 Marks: 0 2 Marks: 2	Slider Crank Mechanism, Collision	Medium	4
Mechanics of Materials	1 Marks: 4 2 Marks: 5	Simple Stress Strains, Analysis of Shear Stress, Stress in Beams, Plain Stress	Medium	14
Theory Of Machines	1 Marks: 3 2 Marks: 2	Gear Strain	Medium	7
Machine Design	1 Marks: 1 2 Marks: 2	Bearing Capacity, Breaks	Easy	5
Fluid Mechanics	1 Marks: 3 2 Marks: 4	Peloton Wheels,	Medium	11
Heat Transfer	1 Marks: 0 2 Marks: 1	Conduction,	Easy	2
Thermodynamics	1 Marks: 2 2 Marks: 4	Entropy, IC Engines, Steady Flow Energy Equation	Medium	10
Manufacturing Engineering	1 Marks: 6 2 Marks: 4	ECM, Sheet Metal, Metal cutting	Tough	14
Industrial Engineering	1 Marks: 0 2 Marks: 2	Linear Program	Medium	4
General Aptitude	1 Marks: 5 2 Marks: 5	Geometry, TSD, Functions, Grammar, Numbers, Work, inference	Easy	15
<b>Total</b>	<b>65</b>			<b>100</b>
<b>Faculty Feedback</b>	Majority of the question were concept based. General Aptitude And Mathematics is Very Easy. Core Subject Questions were 50% easy, 30% medium and 20% tough.			

**General Aptitude**  
**GATE 2018 Examination\* (Memory Based)**  
**Mechanical Engineering**

Test Date: 3-FEB-2018

Test Time: 9:00 AM 12:00 PM

Subject Name: Mechanical Engineering

**General Aptitude**

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

1. Her \_\_\_\_\_ should not be confused with miserliness because she is ever willing to assist those in need.

(A) Cleanliness (B) Punctuality  
(C) Frugality (D) Greatness

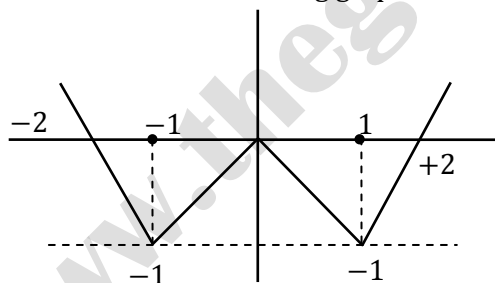
**[Ans. C]**

2. Going by the \_\_\_\_\_ that many hands make light work, the school \_\_\_\_\_ involved all the students in the task

(A) Principle , Principal

**[Ans. A]**

3. Find function of following graph



(A)  $||x| + 1| - 2$  (B)  $||x| - 1| - 1$   
(C)  $||x| + 1| - 1$  (D)  $||x - 1| - 1|$

**[Ans. B]**

4. If by decreasing length of rectangle by 10 m and breath by 5 m it becomes a square .The area lost from rectangle is  $650 \text{ m}^2$ . Find the area of original rectangle?

(A) 1125 (B) 2250  
(C) 2924 (D) 4500

**[Ans. B]**

5. 7 machines take 7 min to make 7 identical toys. At the same rate how many minutes would it take for 100 machines to make 100 toys?
- (A) 1 (B) 7  
(C) 100 (D) 700
- [Ans. B]**

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

6. If a and b are integers and  $a + a^2b^3$  is odd then
- (A) a and b odd (B) a and b even  
(C) a even b odd (D) a odd b even
- [Ans. D]**

7. From the time, the front of a train enters a platform it take 25 sec for back of the train to leave the platform, if train is travelling at 54 km/hr. At the same speed it takes 14 sec to pass a man running at 9 km/h in same direction of the train. Length of train and platform in m is?
- (A) 175 and 200 (B) 210 and 140  
(C) 162.5 and 187.5 (D) 245 and 130
- [Ans. A]**

8. For integers a, b, c, minimum and maximum of  $a + b + c$   
If  $\log |a| + \log |b| + \log |c| = 0$
- (A) -3 and 3 (B) -1 and 1  
(C) -1 and 3 (D) 1 and 3
- [Ans. A]**

9. A number consists of 2 digits, the sum of digits is 9. If 45 is subtracted from the number its digits are interchange. What is the number?
- (A) 63 (B) 72  
(C) 81 (D) 90
- [Ans. B]**

10. 1. Some roses are red  
2. All red flower fade quickly  
3. Some roses fade quickly
- (A) If statement ① is true and statement ② is false then statement ③ is false  
(B) If Statement ① true statement ② false then statement ③ is true  
(C) If Statement ① true statement ② true the statement ③ true  
(D) If Statement ① false statement ② false the statement ③ false statement
- [Ans. C]**

**Technical**

1.  $A = \begin{bmatrix} -4 & 1 & -1 \\ -1 & -1 & -1 \\ 7 & -3 & 1 \end{bmatrix}$ . Find rank of A

- (A) 1 (B) 2  
(C) 3 (D) 4

[Ans. B]

2.  $F(z)$  is a function of  $z$  and  $z = x + iy$  then  
 $F(z) = iz + k$  Real part ( $z$ ) +  $i$  imaginary part of ( $z$ )  
What is the value of  $k$ ?  $F(z)$  satisfies C – R equations

- (A) 0 (B) 1  
(C) -1 (D) 4

[Ans. B]

3. Consider the function  $F(x)$  which is continuous in  $(a, b)$  there exists ' $\xi$ '  $\in [a, b]$  such that  $\int_a^b f(x) dx$  is \_\_\_\_\_

- (A)  $f(\xi)(b - a)$  (B)  $f(b)(\xi - a)$   
(C)  $f(a)(b - \xi)$  (D) 0

[Ans. A]

4. An explicit forward euler method is used to numerically solve differential equation  $\frac{dy}{dt} = y$  using time step of 0.1 with initial condition  $y(0) = 1$ ,  $y(1)$  computed by this method is \_\_\_\_\_

[Ans. \*]Range: 2.55 to 2.65

5.  $\oint_S \vec{r} \cdot \hat{n} ds = ?$  over the closed surface 'S' bounding the volume 'V' where  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$  is the position vector

- (A) 1V (B) 2V  
(C) 3V (D) 4V

[Ans. C]

6. Let  $x_1, x_2$  be two normal random (independent) variables with means  $\mu_1, \mu_2$  and standard deviation  $\sigma_1, \sigma_2$ , consider  $y = x_1 - x_2$  is random variable then \_\_\_\_\_ (given that  $\mu_1 = \mu_2 = 1, \sigma_1 = 1, \sigma_2 = 2$ )

- (A) Y is normal distributed random variable with mean=0, variance=1  
(B) Y is normal distributed random variable with mean=0, variance=5  
(C) Y is not normal distributed random variable with mean =0, variance =1  
(D) Y is not normal distributed random variable with mean=0, variance =5

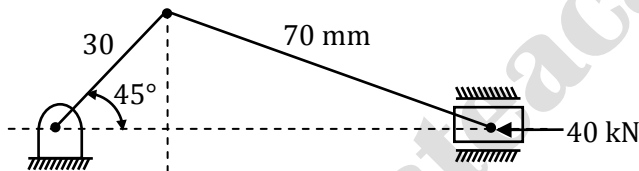
[Ans. B]

7. A six faced fair dice is rolled 5 times then percentage probability of obtaining '1' at least 4 times is  
 (A) 33 (B) 3.33  
 (C) 0.33 (D) 0.0033  
**[Ans. C]**

8. A box contains 4 Red, 4 Green, 4 Black balls, 3 balls are pulled out of the box at random one after another without replacement. Probability of getting all 3 balls is red.  
 (A)  $\frac{1}{72}$  (B)  $\frac{1}{55}$   
 (C)  $\frac{1}{36}$  (D)  $\frac{1}{27}$   
**[Ans. B]**

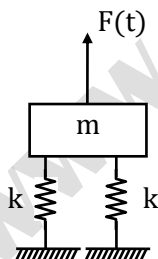
9. F(s) is the L.T of  $f(t) = 2t^2 e^{-t}$  then find  $F(1) = 0.5$   
**[Ans. \*]Range: 0.5 to 0.5**

10. In a slider crank mechanism, crank is of length 30 mm and connecting rod is of length 70 mm. At the instant when crank is making  $45^\circ$  with the line of reciprocation of slider what will be the turning moment (N-m) on crank if a force of 40 kN is applied on the slider as shown?



**[Ans. \*]Range: 1118.33 to 1118.33**

11. A mass 200 kg is supported with two springs of stiffness  $k=10$  kN/m and subjected to a harmonic force  $F(t) = 50 \cos 5t$ . Find the magnitude of dynamic force transmitted from each mounting to the ground



**[Ans. \*] We Will update soon**

12. For minimum Value of  $3x+5y$

So that

$$3x+5y \leq 15,$$

$$4x+9y \leq 8;$$

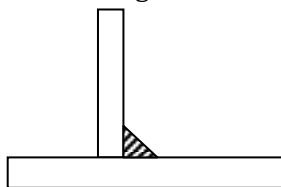
$$13x+2y \leq 2;$$

$$x \geq 0;$$

$$y \geq 0.$$

**[Ans. \*] Range: 0 to 0**

13. Below is figure shown what the name of weld based on shaded region is.



(A) Fillet weld

(B) Groove weld

(C) Spot weld

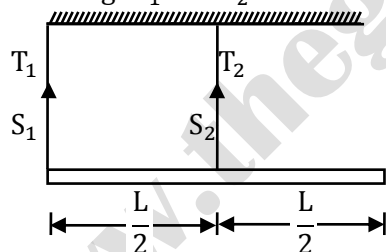
(D) Plug weld

**[Ans. A]**

14. A block of mass 2 kg is sliding along a curved surface from P. At point Q, it's velocity is 20m/s and radius of curvature is 2 m. What will be the normal force acting block at Q?(Take  $g = 10 \text{ m/s}^2$ )

**[Ans. \*]Range: 420 to 420**

15. A rigid bar of weight 100 N and length L is supported to a fix support with the help of two inextensible strings  $S_1$  and  $S_2$ . At equilibrium, what is the magnitude of tension developed in strings  $T_1$  and  $T_2$ ?



(A) 100 N, 0 N

(B) 0 N, 100 N

**[Ans. B]**

16. A point mass is shot vertically upward with a gun and initial velocity 4 m/s at  $t = 0$ . It comes back to ground and rebound but 20% of the velocity is lost in rebounding. If the final velocity comes to zero then how much time it will take?(Take  $g = 10 \text{ m/s}^2$ )

(A) 1

(B) 2

(C) 4

(D)  $\infty$

**[Ans. C]**

17. A steel column of rectangular cross-section is simply supported at ends. Length of the column is 1.5 m and cross section dimensions are 15 mm × 10 mm. Modulus of elasticity is 200 GPa. The critical load (in kN) which the column can carry is \_\_\_\_\_ kN.

[Ans. \*] Range: 1.09 to 1.09

18. A bar is compressed up to half of its original length. The magnitude of true strain produced in cylinder is \_\_\_\_\_?

[Ans. \*] Range: -0.693 to -0.693

19. If  $\sigma_1$  and  $\sigma_3$  are maximum and minimum values of principle stresses algebraically then the maximum value of shear stress is?

(A)  $\frac{\sigma_1 - \sigma_3}{2}$

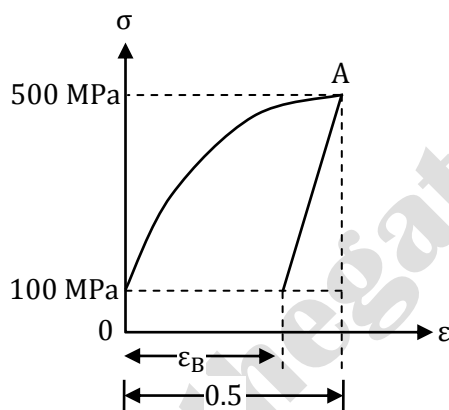
(B)  $\sqrt{\frac{\sigma_1 - \sigma_3}{2}}$

(C)  $\left(\frac{\sigma_1 + \sigma_3}{2}\right)$

(D)  $\sqrt{\frac{\sigma_1 + \sigma_3}{2}}$

[Ans. A]

20. True stress ( $\sigma$ ) Vs True strain ( $\epsilon$ ) curve is shown in figure when material is loaded up to A. At A stress is 500 MPa and strain is 0.5. Then material is unloaded up to B, what will be the strain at B if stress at B is 100 MPa, young's modulus of material is 200 GPa.

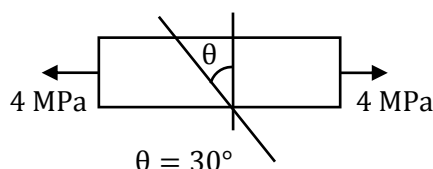


[Ans. \*] Range: 0.498 to 0.498

21. A column having a rectangular section of width = 15 mm and height = 10 mm is simply supported its having length of 1.5 mm. Calculate critical buckling load (N).

[Ans. \*] Range: 1.1 to 1.1

22. Two wooden pieces are attached as shown in figure below. Their attached with figure so the angle ( $\theta$ ) is given in the diagram is  $30^\circ$  and the whole assembly experience 10 in tensile stress of 4 MPa.





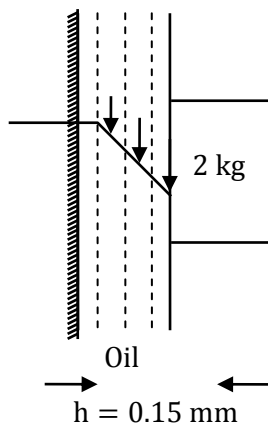
1. Maximum tensile stress glue can take 2.5 MPa
2. Shear stress glue can take 1.5 MPa

Assume that failure will be happen in glue not in wood?

- (A) It fails by to tensile stress not shear stress
- (B) It fails by shear stress not tensile?
- (C) Fails by both of them
- (D) Fail by none of them

[Ans. C]

23. A block of mass 2 kg slides down steadily against a vertical wall. A very thin layer of oil acts as a lubricant between the block and the wall.



If interface area of block is  $0.04 \text{ m}^2$ , its dynamic viscosity is  $7 \times 10^{-3} \text{ Pa}\cdot\text{sec}$ . Find out the terminal velocity of the block.

Assume the velocity profile develop in oil layer due to sliding of block to be linear.

[Ans. \*]Range: We Will update soon

24. An engine operates on otto cycle with initial supply of air at 0.1 MPa and  $15^\circ\text{C}$ . The compression ratio of cycle is 8 and heat supplied is 500 kJ/kg. What is the maximum temperature for the cycle?

[Ans. \*]Range: We Will update soon

**MORE QUESTIONS COMING SOON**