



GATE 2021 Examination* (Memory Based)

Mechanical Engineering

Test Date: 14th Feb 2021

Test Time: 03-00 pm to 06-00 pm

Stream Name: Mechanical Engineering

General Aptitude

1. A box contains 15 blue bolls and 45 black balls. If 2 balls are selected randomly, without replacement, the probability of an outcome in which the first selected is a blue ball and the second selected is a black ball is _____.
(A) $3/16$
(B) $45/236$
(C) $3/4$
(D) $1/4$
[Ans. B]
2. The front door of Mr. X's house faced east. Mr. x leaves the house walking 50 m straight from the back door that is situated directly opposite to the front door. He then turns to his right walks for another 50 m and stops. The direction of the point Mr. X is now located at with respect to the starting point is _____.
(A) North West
(B) North East
(C) South East
(D) West
[Ans. A]
3. Five person P, Q, R, S, T are to be seated in a row, all facing the same direction, but not necessarily in the same order. P and T cannot be seated at either end of the row. P should not be seated adjacent to S. R is to be seated at the second position from the left end of the row. The number of distinct seating arrangements possible is
(A) 2
(B) 4
(C) 3
(D) 5
[Ans. C]

4. A digital watch x beeps every 30 secs while watch y beeps 32 secs. They beeped together at 10 AM. The immediate next time that they will beep together is _____.

(A) 10.42 AM
 (B) 11.00 AM
 (C) 10.00 AM
 (D) 10.08 AM

[Ans. D]

5. If $\oplus \div \ominus = 2$; $\oplus \div \Delta = 3$; $\ominus + \Delta = 5$; $\Delta \times \otimes = 10$; then the value of $(\otimes - \oplus)^2$, is

(A) 4
 (B) 1
 (C) 0
 (D) 16

[Ans. B]

6. Which of the following is grammatically correct?

i. The number of candidates who appear for the GATE examination is staggering.
 ii. A number of candidates from my class are appearing for the GATE examination.
 iii. The number of candidates who appear for the GATE examination are staggering.
 iv. A number of candidates from my class is appearing for the GATE examination.

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

[Ans. B]

7. Statement 1: All entrepreneurs are wealthy
 Statement 2: all wealthy are risk seekers
 Conclusion 1: All risk seekers are wealthy
 Conclusion 2: only some entrepreneurs are risk seekers
 Which is correct?

(A) Only conclusion I is correct
 (B) Only conclusion II is correct
 (C) Both conclusion I and conclusion II are correct
 (D) Neither is correct

[Ans. D]

8. Consider a square sheet of side 1 unit. The sheet is first folded along the main diagonal. This is followed by a fold along its line of symmetry. The resulting folded shape is again folded along its line of symmetry. The area of each face of the final folded shape in square units, equal to

(A) 1/8
 (B) 1/16
 (C) 1/4
 (D) 1/3

[Ans. D]

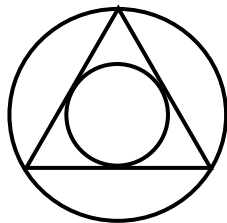
9. The world is going through the worst pandemic in the past hundred years. The air travel industry is facing a crisis, as the resulting quarantine requirement for travelers led to weak demand.

In relation to the first sentence above, what the second sentence do?

- (A) The two statement are unrelated
 (B) Restates an idea from the first sentence
 (C) Second sentence entirely contradicts the first sentence
 (D) States an effect of the first sentences

[Ans. *]

10. The ratio of the area of the inscribed circle to the area of the circumscribed circle of an equilateral triangle is _____.



- (A) 1/6
 (B) 1/8
 (C) 1/2
 (D) 1/4

[Ans. D]

Technical

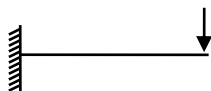
1. Torque by engine is $T(\theta) = 12000 + 2500 \sin(2\theta)$ N. m, θ is measured from inner dead centre. The mean speed of the engine is 200 rpm and it drives a machine that provides a constant resisting torque. If variation of the speed from the mean speed is not to exceed 10.5%. The minimum mass moment of inertia of the Hyweed should be _____ kgm^2 .

[Ans. *]

2. Steel cubic block of side 200 mm s/t $P = 250$ MPa. $E = 200$ GPa, $\mu = 0.3$. Side is reduced by _____ mm.

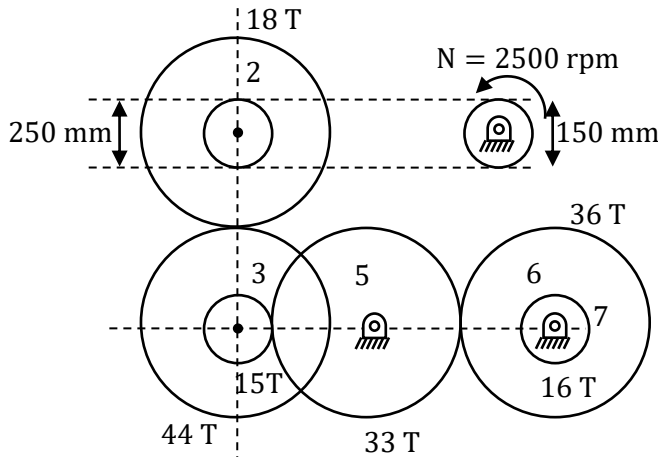
[Ans. *]

3. $EI = 200 \times 10^6$ Nm^2 .
 Area (total) = 10,000 Nm^2 . Slope of free end is _____ μrad .



[Ans. *]

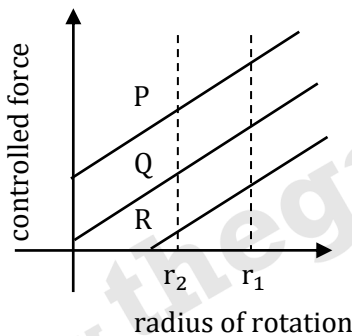
4. Find N_7 and direction



- (A) 255.68 rpm; anticlockwise
- (B) 255.68; clockwise
- (C) 575.28 rpm; anticlockwise
- (D) 575.28; clockwise

[Ans. *]

5. Controlling force curves P, Q and R for a spring controlled governor are shown in the figure. Where r_1 and r_2 are any two radii of rotation



- (A) P-unstable, Q-Stable, R-Isochronous
- (B) P-Stable, Q-Unstable, R-Isochronous
- (C) P-Stable, Q-Isochronous, R-Unstable
- (D) P-Unstable, Q-Isochronous, R-Stable

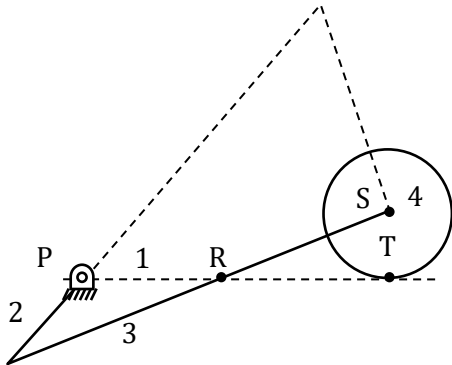
[Ans. *]

6. Allowance provided in between a hole and a shaft is calculated from the difference between _____.

[Ans. *] Upper limit of shaft and lower limit of hole.



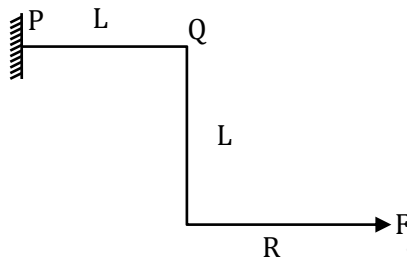
7. Select correct statement about Instantaneous Centre



- (A) Only P, Q, R, S and U are Instantaneous Centre
- (B) Only P, Q, S and T are Instantaneous Centre
- (C) Only P, Q and S are Instantaneous Centre
- (D) All points are Instantaneous Centre

[Ans. *]

8. Horizontal deflection



- (A) $\frac{4FL^3}{3EI}$
- (B) $\frac{FL^3}{3EI}$
- (C) $\frac{5FL^3}{3EI}$
- (D) $\frac{2FL^3}{3EI}$

Refer & Win

Get Exciting Benefits

Share your key to Success

Refer upto 5 buddies

Refer Now



GATE '21 Video Solutions [Watch Now](#)

GATE Rank Predictor

[Predict Now](#)



9. $V_1 = 75 \text{ mm} \times 125 \times 20$; $t = 2 \text{ min}$, $n = 2$ (Index)
 $V_2 = [D = 50 \text{ mm}, n = 50 \text{ mm}, t = ?$
[Ans. *]
10. Size distribution of the power particles used in power metallurgy process can be determined by
 (A) laser deflection
 (B) laser absorption
 (C) laser penetration
 (D) laser scattering
[Ans. *]
11. Thickness, width, length of a slab are 50, 250, 3600 mm. a rolling operation on this slab reduces the thickness by 10% and increases width by 3%. Final length = _____.
[Ans. *]
12. Spot welding:
 $d = 5 \text{ mm}$, $t = 1 \text{ mm}$, $t = 0.15 E = 20 \text{ J/mm}^3$, $n = 10\%$; $p = \text{_____ kW}$
[Ans. *]
13. Value of $(1 + i)^8 = ?$
 (A) $16i$
 (B) $4i$
 (C) 4
 (D) 16
[Ans. *]
14. Consider an $n \times n$ matrix A and non-zero $n \times 1$ vector p . There product $Ap = \alpha^2 p$, where $\alpha \in \mathbb{R}$ and $\alpha \notin \{-1, 0, 1\}$ based on the given information, the eigen value of A^2 is _____.
 (A) α
 (B) α^2
 (C) $\sqrt{\alpha}$
 (D) α^4
[Ans. *]
15. Mean & variance respectively of binomial distribution for n independent trials with the probability of success as p , are
 (A) \sqrt{np} , $np(1 - 2p)$
 (B) np , np
 (C) np , $np(1 - p)$
 (D) \sqrt{np} , $\sqrt{np(1 - p)}$
[Ans. *]



16. Value of $\int_4^{5.2} \ln x \, dx$ using Simpson's $1/3^{\text{rd}}$ rule with interval size 0.3 is _____.
- (A) 1.51
(B) 1.06
(C) 1.83
(D) 1.6
[Ans. C]
17. Laplace Transform of $f(t)$ is $\frac{S+3}{(S+1)(S+2)}$, then $f(0)$ is
- (A) $3/2$
(B) 1
(C) $1/2$
(D) 0
[Ans. B]
18. $\int_0^{\pi/2} \int_0^{\cos \theta} r \sin \theta \, dr \, d\theta = ?$
- (A) 0
(B) $1/6$
(C) $4/3$
(D) π
[Ans. *]
19. Find the +ve real root of $x^3 - x - 3 = 0$ using N-R method. If the starting guess (x_0) is 2, the value of x_2 is _____.
- [Ans. *]**
20. $1 + y \frac{dy}{dx} = y$ & $y(1) = 1$, find solution
- (A) $y^2 e^y = e^x$
(B) $2ye^4 = e^x + e$
(C) $ye^y = e^x$
(D) $(1 + y)e^y = 2e^x$
[Ans. *]
21. Let the super script T represent the transpose operation. Consider the function $f(x) = \frac{1}{2} x^T Qx - r^T x$, where x & r are $n \times 1$ vectors and Q is a symmetric $n \times n$ matrix. the stationary point of $f(x)$ is _____
- (A) $Q^T r$
(B) r
(C) $Q^{-1} r$
(D) $\frac{r}{r^T r}$
[Ans. *]



Govt. **JOBS**

RRB JE | SSC JE | RRB NTPC

COURSE FEATURES

E-Lectures | Books | Online Tests | Live Doubt Session

Learn More
Visit Now

govt-jobs.thegateacademy.com

22. A 2-D flow, $u = 2xyt$ and $V = y^2t$, $t \rightarrow$ time ϵ_q^n , for streamline passing through $x = 1, y = 1$ is

- (A) $x^2 y = 1$
 (B) $x^2 y^2 = 1$
 (C) $xy^2 = 1$
 (D) $\frac{x}{y^2} = 1$

[Ans. *]

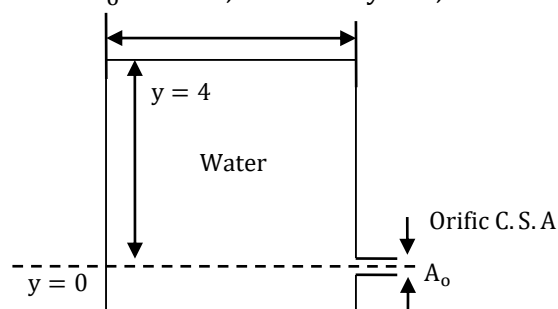
23. Which of the following is responsible for eddy viscosity (or turbulent viscosity) in a turbulent boundary layer on a plate?

24. For a 1-D, incompressible flow having velocity components u and v in x & y directions respectively the expression.

$$\frac{\partial(u^2)}{\partial x} + \frac{\partial(uv)}{\partial y}$$

- (A) $2u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y}$
 (B) $u \frac{\partial u}{\partial x} + u \frac{\partial v}{\partial y}$
 (C) $2u \frac{\partial u}{\partial x} + u \frac{\partial v}{\partial y}$
 (D) $u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y}$

25. Water flows out from a large tank of C. S. $A_t = 1\text{m}^2$ through a small, rounded orifice of C. S. $A_o = 1\text{cm}^2$, located at $y = 0$, is 1m. Given, $g = 9.8\text{ m/s}^2$



Neglecting any losses, the time taken by water in the tank to reach a level of $y = H/4$ is _____ seconds