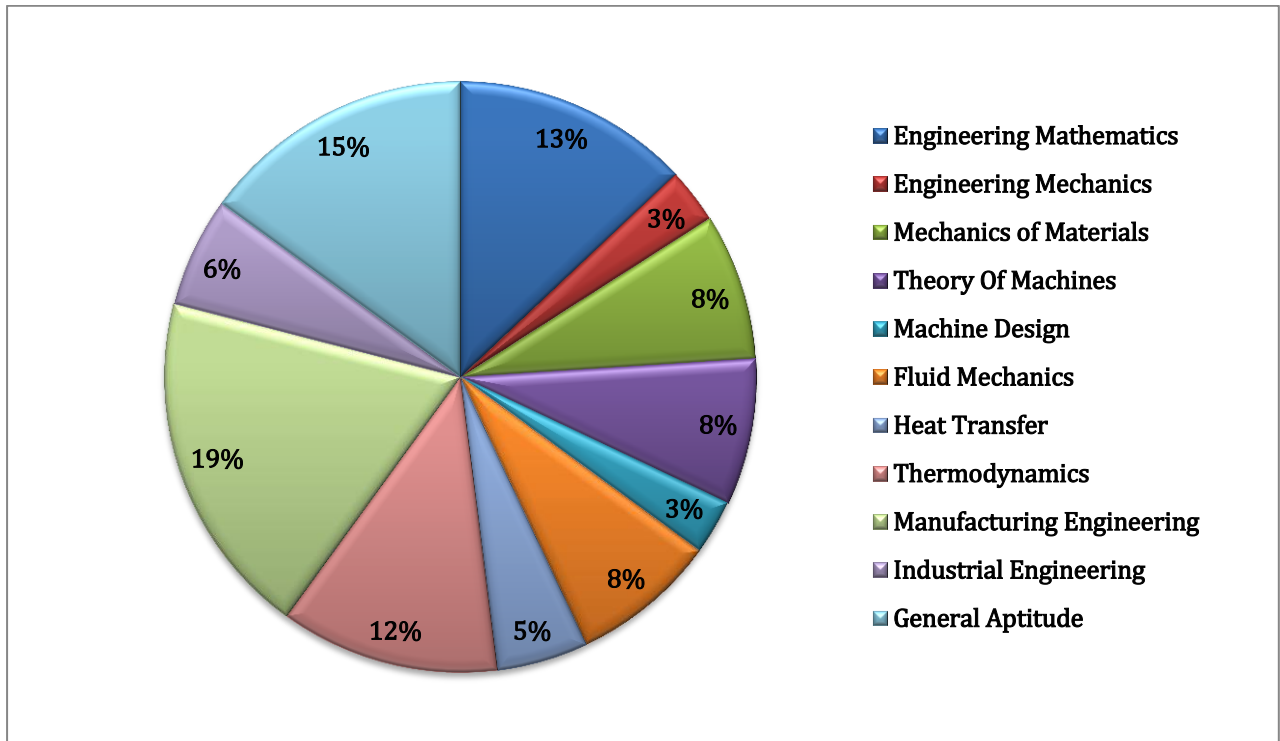


ANALYSIS OF GATE 2018*(Memory Based)

Mechanical Engineering



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ME ANALYSIS-2018_3-Feb_Afternoon

SUBJECT	No. of Ques.	Topics Asked in Paper(Memory Based)	Level of Ques.	Total Marks
Engineering Mathematics	1 Marks: 5 2 Marks: 4	Random Variable, Complex Variable, Divergence, Complementary Function, Determinant, Variable Separable Method, Fourier Series	Easy	13
Engineering Mechanics	1 Marks:1 2 Marks: 1	Slider Crank Mechanism, Collision	Medium	3
Mechanics of Materials	1 Marks: 2 2 Marks: 3	Columns, Simple Stress and Strain	Medium	8
Theory Of Machines	1 Marks: 2 2 Marks: 3	Gear Strain, Vibration, Torsion, Cams	Medium	8
Machine Design	1 Marks: 1 2 Marks: 2	Bearing Capacity, Breaks	Easy	3
Fluid Mechanics	1 Marks: 2 2 Marks: 3	Fluid Properties, Flow through pipes	Medium	8
Heat Transfer	1 Marks: 1 2 Marks: 2	Radiation, Convection	Easy	5
Thermodynamics	1 Marks: 2 2 Marks: 5	Ideal Gas, IC Engine, Vapour compression cycle, Refrigeration	Medium	12
Manufacturing Engineering	1 Marks: 7 2 Marks: 6	Milling, Metal Cutting, Forming, EDM	Tough	19
Industrial Engineering	1 Marks: 2 2 Marks: 2	Inventory Management, Linear Programming	Tough	6
General Aptitude	1 Marks: 5 2 Marks: 5	Geometry, TSD, Functions, Grammar, Numbers, Work, inference	Easy	15
Total	65			100
Faculty Feedback	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.			

GATE 2018 Examination*(Memory Based)**Mechanical Engineering****Test Date: 3-Feb-2018****Test Time: 2:00 PM 5:00 PM****Subject Name: Mechanical Engineering****General Aptitude**

1. A contract is to be completed in 52 days and 125 identical robots were employed each operated for 7 hr/day. After 39 days, $\left(\frac{5}{7}\right)^{\text{th}}$ of work was completed. How many additional robots would be required to complete the work on time. If each robot is now operational for 8 hrs a day

[Ans. 7]

2. Complete the Series:
BC FGH LMNO _____?

[Ans. TUVWX]

3. $\frac{1}{1+\log_u vw} + \frac{1}{1+\log_v wu} + \frac{1}{1+\log_w uv} = ?$

[Ans. 1]

4. Perimeter of circle, square and equilateral triangle are equal then
(A) Area of circle will be maximum.
(B) Area of square will be maximum.
(C) Area of equilateral triangle will be maximum.
(D) All area will be equal.

[Ans. A]

5. The dress _____ her, that they all _____ her for appearance.
(A) Complimented, Complimented
(B) Complimented, Complemented
(C) Complimented, Complimented
(D) Complemented, Complemented

[Ans. A]

6. A wire bent over square has area of 1936 m^2 . Wire is cut into two parts a and b such that $a = 3b$. Now 'a' is bent over square and 'b' bent over circle. Find out the sum of area of square and circle

[Ans. *]Range: 1243 to 1243

7. A House Number has to be allotted with the following Conditions
1. If the Number is a multiple of 3 it will lie between 50 to 59
 2. The Number will not be multiple of 4 it will lie between 60 to 69
 3. The Number will not be multiple of 6 it will lie between 70 to 79.
- Identify the House No.

(A) 54 (B) 65
(C) 66 (D) 76

[Ans. D]

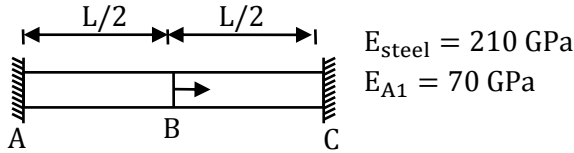
8. There are 40 students in a class. They have to watch movies from A, B and C. They either watch one or all three movies. 16 students watch A, 13 students watch B, 19 students watch C. How many students watched all three movies?

[Ans. *]Range: 4 to 4

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Technical

1. A bimetallic cylindrical bar of cross sectional area 1m^2 is made by steel and aluminum as shown. To maintain axial strain 10^{-6} in both steel and aluminum (10^{-6} tensile in steel and 10^{-6} compressive in Al) The force $P = \underline{\hspace{2cm}}$ kN.

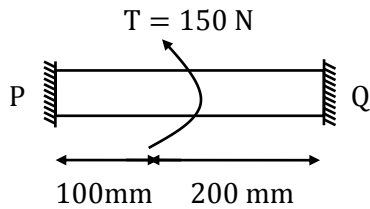


[Ans. *] Range: 280 to 280

2. Minimum axial compressive load required to initiate buckling for a pinned –pinned slender column with bending stiffness EI and length L is _____

Ans: $\frac{\pi^2 EI}{L^2}$

3. If the bar is loaded with a torsional load of 150 Nm as shown. Find the torsional reaction at P and Q



- (A) 100,50 (B) 50,100
(C) 50,50 (D) 100,100

[Ans. A]

4. Given scalar function $\phi = \ln(r)$, then find its gradient $\nabla\phi = ?$

Given ($\vec{r} = xi + yj + zk, |\vec{r}| = r = \sqrt{x^2 + y^2 + z^2}$)

- (A) r (B) $\frac{\vec{r}}{|r|}$
(C) $\frac{\vec{r}}{r \cdot \vec{r}} = \frac{\vec{r}}{r^2}$ (D) $\frac{\vec{r}}{|r|^3}$

[Ans. C]

5. A wire bent over square has area of 1936 m^2 , wire is cut into two parts a and b such that $a=3s$. Now 'a' is bent over square and 's' is bent over circle.

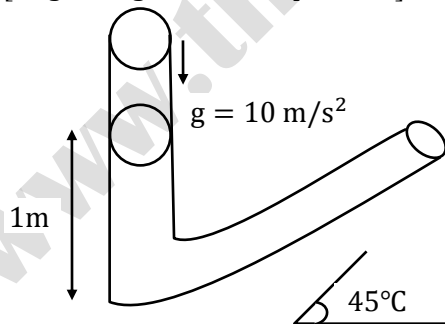
Find out the sum of area of square and circle

[Ans. *] Range: 1243 to 1243

6. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 1 \end{bmatrix}$ then $\det(A^{-1}) = \underline{\hspace{2cm}}$

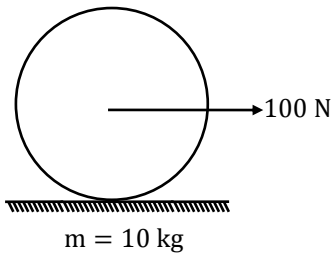
[Ans. *] Range: 0.25 to 0.25

7. For an ordinary DE $y^3 \frac{dy}{dx} + x^3 = 0$ and $y(0) = 1$ then $y(-1) =$ _____
[Ans. *]Range: 1.4 to 1.5
8. For a Fourier series $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos(nx)$ the value of co-efficient of function $f(x) = \cos^2 x$ in $[0, \pi]$ is _____
[Ans. $a_0 = \frac{1}{2}$. $a_2 = \frac{1}{2}$]
9. The divergence of vector field $\vec{u} = e^x (\cos y i + \sin y j)$ is _____
[Ans. *] $2e^x \cos y$
10. Consider a function 'u' which depends on position 'x' and time 't'. The partial differential equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ is known as
 (A) Wave equation (B) Heat equation
 (C) Laplace equation (D) Energy equation
[Ans. B]
11. For a counter clockwise integration around a unit circle centered at origin $\oint_C \frac{1}{5z-4} dz = A\pi i$, The value of 'A' is _____
[Ans. *]Range: 0.4 to 0.4
12. $y^3 \frac{dy}{dx} + x^3 = 0$, given $y(0) = 1$, then find $y(-1) = 0$
[Ans. *]Range: 0 to 0
13. A ball is dropped from a height of 1m in a friction less tube. If the tube profile is approximated as straight line the total distance travelled by the ball is _____
[Neglecting the curved position]



[Ans. *]Range: 2.2 to 2.6

14. A disc of mass 10 kg and radius 1 m is acted upon by a 100N force at the centre as shown Find the linear acceleration of center of the disc?



[Ans. *]Range: 6.4 to 7

15. Let x_1 and x_2 be two independent exponential distribution R.V with mean 0.5 and 0.25 respectively. Then $y = \min(x_1, x_2)$ is
 (A) Exponential distribution with mean is $1/6$
 (B) Exponential distribution with mean is 2
 (C) Normal distribution with mean is $3/4$
 (D) Normal distribution with mean is $1/6$

[Ans. A]

16. The problem of maximizing $z = x_1 - x_2$ subject to constraints
 $x_1 + x_2 \leq 10$; $x_1 \geq 0$ and $x_2 \leq 5$ has
 (A) No solution (B) One solution
 (C) Two solution (D) More solution

[Ans. B]

17. The peak wave length of radiation emitted by a black body at a temperature of 2000 k is $1.45 \mu m$. If the peak wave length of emitted radiation changes to $2.90 \mu m$, then the temperature (in k) of the black body is _____ (k)

[Ans. *]Range: 1000 to 1000

18. In a steam power plant steam is condensed in a condenser at $30^\circ C$. The cooling water enters the condenser at $30^\circ C$. The cooling water enters the condenser at $14^\circ C$ and leaves at $12^\circ C$. If the total surface area of tubes is $50 m^2$ and overall heat transfer co-efficient is $2000 w/m^2 k$ then heat transfer to the condenser is _____

[Ans. *] 1154.16 to 1154.16

19. For ideal gas undergoing a process ① to ② change in entropy (Δs) is given by

(A) $C_p \ln \left[\frac{T_2}{T_1} \right] - R \ln \left[\frac{P_2}{P_1} \right]$

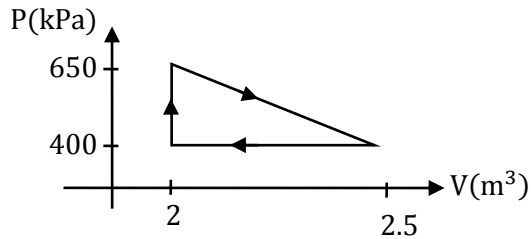
(B) $C_p \ln \left[\frac{T_2}{T_1} \right] + R \ln \left[\frac{P_2}{P_1} \right]$

(C) $C_p \ln \left[\frac{T_2}{T_1} \right] + R \ln \left[\frac{V_1}{V_2} \right]$

(D) $C_p \ln \left[\frac{V_2}{V_1} \right] + R \ln \left[\frac{T_2}{T_1} \right]$

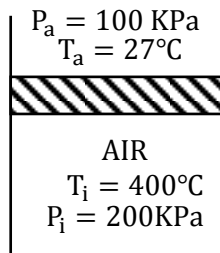
[Ans. A]

20. Engine operates on a reversible cycle as shown. Find work done by the engine for one cycle _____ [in kJ/cycle]



[Ans. *] Range: 62.5 to 62.5

21. Air held in a non-insulated piston-cylinder arrangement is at an initial pressure of 200 KPa and an initial temperature of 400°C. The ambient temperature and pressure are 27°C and 100 KPa. At what temperature of air inside the cylinder the piston starts sinking.



Cross-section area of piston = 100cm^2

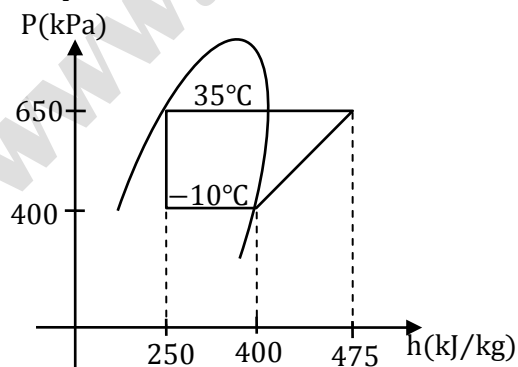
Mass of piston = 25 kg ; $g = 10\text{ m/s}^2$

[Ans. *] Range: 420.625 to 420.625

22. A heat engine working on Otto cycle generates 70 kW while consuming 10.3 kg/hr of fuel. The calorific value of fuel is 4000 kJ/kg. Compression ratio of the cycle will be _____

[Ans. *] Range: 7.614 to 7.614

23. A standard vapour compression cycle working between -10°C and 35°C produces a cooling effect of 15 kW. Enthalpies of the refrigerant at different stages are given in the (p-h) graph. If isentropic efficiency of compressor is 0.75 then power consumed by the compressor is _____

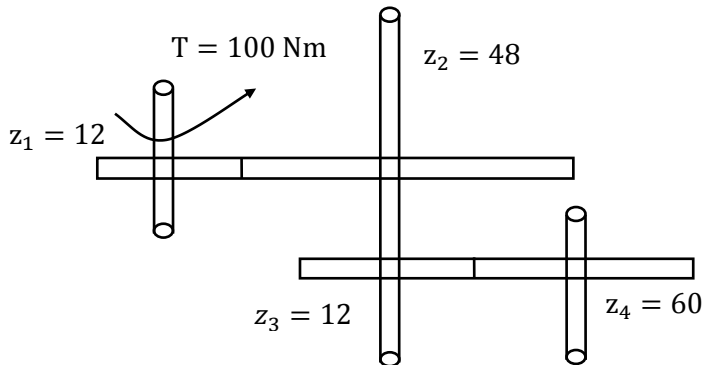


[Ans. *] Range: 0.1 to 0.1

24. Ambient air at a pressure of 100Kpa and 30°C dry bulb temperature has 60% relative humidity. The saturated vapour pressure at 30°C is 4.24 kPa specific humidity of air is _____ [g/kg of dry air]

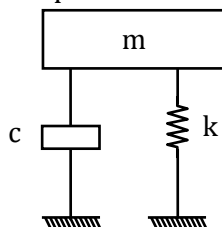
[Ans. *]Range: 16.2367 to 16.2367

25. For a friction less gear train torque applied on the gear having 12 tooth is 100 Nm. What will be the torque at the output shaft having the gear with 60 tooth_____



[Ans. *]Range: 2000 to 2000

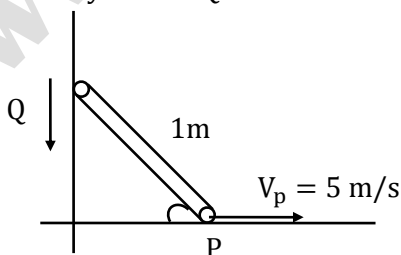
26. For an under damped system which of the following statement is always true in comparison with un-damped system.



- (A) Time period of vibration increases
(B) Time period of vibration decreases
(C) Time period remain constant
(D) Frequency of vibration increases

[Ans. A]

27. A rigid link 'PQ' of length 1 m is sliding in the corner of the wall as shown in the figure. At the instant when the rod is making 45° with the horizontal, velocity of end 'P' is 5 m/s. Velocity of end 'Q' of the rod at this instant is _____m/s



[Ans. *]Range: 5 to 5

28. In a cam follower mechanism the follower rises 'h' as the cam rotates by ' Δ ' radians at constant angular velocity ω (rad/s). The follower is rising with uniform acceleration during first half of the rise and with uniform deceleration during second half of the rise. Maximum velocity of the follower _____

[Ans. $\frac{2h\omega}{\Delta}$]

More Questions Update Soon

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