ACE
Engineering Academy
Hyderabad | New Delhi | Bhopal | Bengaluru | Bhubaneswar | Vijayawada | Visakhapatnam | Tirupati | Pune | Chennai
H.O: 204, II Floor, Rahman Plaza, Opp. Methodist School, Abids, Hyderabad-500001,
Ph: 040-24750242 , 040-24750263, 040-24752469 , 040-24750437

GATE – 2015 – Mechanical Engineering (ME)

(Questions Based on Memory of Students)

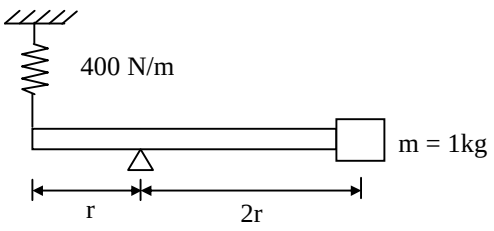
SET – 1 (31st January Evening Session)

01. Match the following where V is velocity vector.

List – I	List – II
P. $\nabla \times V=0$	I. Incompressible
Q. $\nabla.V=0$	II. Steady flow
R. $\frac{DV}{Dt}=0$	III. Irrotational
S. $\frac{\partial V}{\partial t}=0$	IV. Total acceleration is zero

	P	Q	R	S		P	Q	R	S
(A)	III	I	IV	I	(B)	III	I	I	IV
(C)	I	III	IV	I	(D)	I	III	IV	I

02. A machine element can be express as shown consider lever as massless



Natural frequency of system is _____

(A) $\sqrt{\frac{400}{1}}$ (B) $\sqrt{\frac{400}{2}}$

(C) $\sqrt{\frac{400}{3}}$ (D) $\sqrt{\frac{400}{4}}$

03. A fair dice is thrown 4 times. Probability of getting at least two 'SIX' is

(A) $\frac{125}{432}$ (B) $\frac{16}{19}$ (C) $\frac{125}{430}$ (D) $\frac{400}{432}$

04. A current carrying wire of 10 mm diameter is insulated with 2 mm thickness of insulator of thermal conducting 0.08 W/mK. Heat transfer coefficient of surface is 10 W/m^2K. Then correct statement for further addition of insulation is

(A) Heat transfer increases

(B) Heat transfer decreases

(C) Heat transfer increases to maximum then decreases

(D) Heat transfer decreases to minimum then increases

05. Find the value of $\lim_{x\to 0} \frac{1-\cos x^2}{2x^4}$

(A) $\frac{1}{4}$ (B) 0 (C) (D) indefinite

06. Solve the differential equation $\frac{d^2y}{dx^2} = y$ which passes through origin and (*l*n2,3/4). The solution is_____

(A) $y = \frac{1}{2}\left(e^x - e^{-x}\right)$ (B) $y = \frac{1}{2}\left(e^x + e^{-x}\right)$

(C) $y = \frac{1}{2}e^x - e^{-x}$ (D) $y = \frac{1}{2}e^x + e^{-x}$

07. Velocity vector is defined by

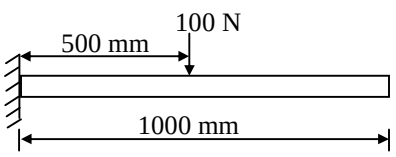
$V = (a_1x+b_1y+c_1z)i+(a_2x+b_2y+c_2z)j$
$+(a_3x+b_3y+c_3z)k$

Where $a_1 = 2$, $c_3 = -4$ then value of b_2 for incompressible flow is _____

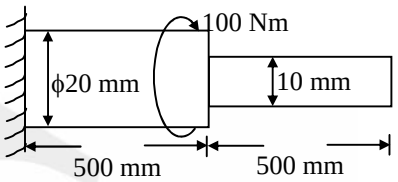
08. Two complex number $z_1 = 5+\frac{5}{\sqrt{3}}i$ and $z_2 = \frac{2}{\sqrt{3}} + 2i$ then argument of $\frac{z_1}{z_2}$ is

(A) 0 (B) 30 (C) 60 (D) 90

09. A cantilever of flexural rigidity 200 Nm^2 is loaded as shown in figure, the deflection at tip in mm is _____

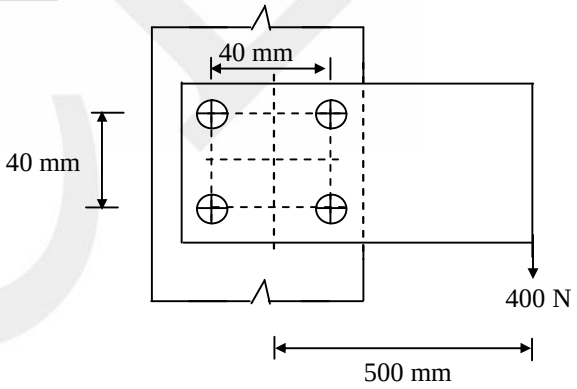


10. A stepped torsional bar is subjected to a torque of 100 Nm as shown in figure below. Modulus of rigidity of material is 90 GPa then angle of twist at end in degree is _____



(A) 0 (B) (C) (D)

11. A horizontal member is attached to vertical member by means of rivet joint as shown in figure. The total load of worst loaded rivet is _____



12. Maximum reduction in thickness for one pass in rolling process is Δh_{max} that can be expressed by $\Delta h_{max} = \mu^2 R$ where μ is coefficient friction between contact surfaces and R is roller radius. Then angle subtended by the deformation zone for $\mu = 0.1$ is _____

13. Solidification time of cast is proportional to $(V/A)^2$ where V is volume of the cast and A is heat transfer surface area. The two cube cast of same material and size are analyze one cube has its top surface insulated and heat transfer takes place from other surface. The solidification time ratio of insulated top cube to that of another cube is _____

(A) $\frac{6}{5}$ (B) $\frac{36}{25}$ (C) $\frac{25}{36}$ (D) $\frac{5}{6}$

14. An ideal gas of mass 1 kg is enclosed in rigid insulated container of volume 1 m^3 (C_p = 1000 J/kgK, C_v = 800 J/kgK). A stirring paddle attached in system rotates 1000 rotation with constant rpm has torque 100 Nm then the final temperature of gas is_____

15. A machining operation with 400 rpm spindle speed has feed rate 0.4 m/min and depth cut 4 mm. Tool has rake angle of 5^o. Chip thickness is found 3 mm. The shear angle is _____

16. N_2 gas in enclosed in close container of $2m^3$ is attached with U tube manometer which has 7 cm deflection of mercury (higher level on open end to atmosphere) with atmospheric pressure 1.01325 bar. Take universal gas constant 8134 J/kg, density of mercury is 13600 kg/m^3. Mass enclosed of N_2 in the container is _____ (in kg)

17. A moist air (10.1 kg) with humidity 0.01 mixed with super heated water vapour if 0.1 kg uniformly. Then final humidity of mixture is_____

18. If a row interchanged in the matrix, then the determinate of matrix is_____

(A) magnitude remains same, sign changes

(B) Magnitude changes, sign remains same

(C) Both magnitude and sign changes

(D) Both magnitude and sign remains same

19. Flow over flate plate has velocity and temperature distribution as u(r,x) = C_1 and T(r,x) $= C_2\left(1-\left(\frac{r}{R}\right)^2\right)$. Then bulk mean temperature of flow field $T_m = \frac{2}{U_m R^2}\int u(r,x)T(r,x).rdr$ is _____

(A) $\frac{0.6C_2}{U_m}$ (B) 0.5 C_2

(C) 0.6 C_2 (D) $\frac{0.5C_2}{U_m}$

20. If X=cost, y = sint , z = $\frac{2}{\pi}$ where $0 \le t \le \frac{\pi}{2}$

Then area enclosed is _____

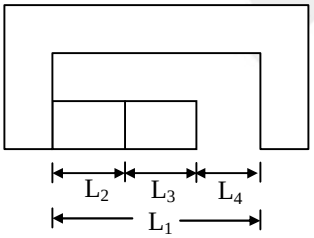
21. CNC machine facet with vertices P(0,0,0) , Q(1,1,0) and R(1,1,1) then area of facet is _____

22. A flow over flat plate has same temperature that of flat then thermal boundary layer is
(A) Thinner than hydrolic boundary layer
(B) Thicker than hydrolic boundary layer
(C) Equal to hydrolic boundary layer
(D) a lot formed

23. A fluid flow with mean speed 2 m/s flow over plate of 2.5 m length has kinematic viscosity 2×10^{-5} m^2/s. Use the relation $C_{fx} = \frac{1.328}{\sqrt{Re_x}}$, for Drag force per limit width of plate is ___

24. A Carnot engine (CE1) working between two reservoir A and B, which have temperature T_A = 100 K and T_B = 500 K. Another Carnot engine (CE2) works between two reservoir B and C, T_C = 300K. Heat rejected by CE1 to reservoir B is completely transferred to CE2 and heat transferred to CE1 from reservoir A is 150 MJ then heat transferred to reservoir C is____

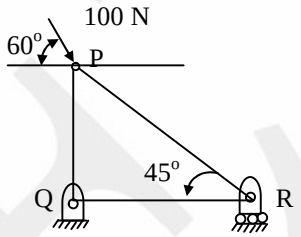
25. If $L_1 = 22 \pm 0.01$ mm
$L_2 = L_3 = 10 \pm 0.005$ mm then L_4 is ____



(A) 2 ± 0.02 (B) 2 ± 0.05
(C) 2 ± 0.002 (D) 2 ± 0.005

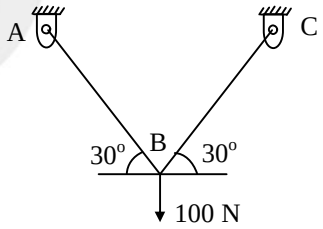
26. For hole size $25^{+0.04}_{+0.02}$ firs with pin size $25^{+0.05}_{+0.05}$ the fitting has minimum clearance of in mm _____

27. The truss is loaded as shown in figure then load carried by member PR and reaction at R are _____



(A) 70.71 N, 50 N (B) 70.71, 150 N
(C) 150 N, 50 N (D)

28. Load on member AB for truss as shown in figure is _____



29. An ant crawling on a path $(x-2)^2 + y^2 = 4$. At point P(4,0) has constant speed 1.57 m/s. Then time taken to reach point Q(2,2) in sec is____

30.

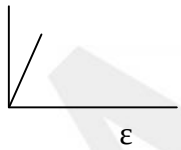
Activity	Duration
1 – 2	3
2 – 3	2
4 – 3	3
1 – 4	3
2 – 5	2
3 – 5	2
4 – 5	4

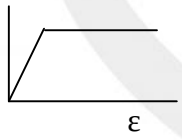
A project has folioing activity and activity duration. Then critical path is _____

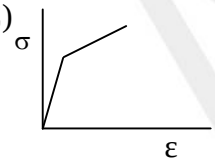
(A) 1 – 4 – 3 – 5 (B) 1 – 2 – 3 – 5

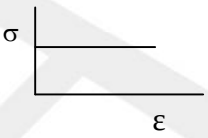
(C) 1 – 2 – 3 – 4 (D) 1 – 2 – 5

31. stress-strain diagram for brittle materials is

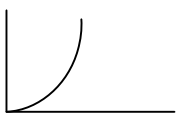
(A) 

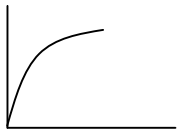
(B) 

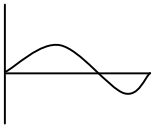
(C) 

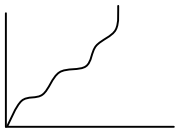
(D) 

32. For a crank-slider mechanism of non zero masses, crank transmitting constant torque τ, rotating in counter clock wise friction as shown in figure correct lot for crank angle with time is

(A) 

(B) 

(C) 

(D) 

33. A venturimeter is attached to pipe of 80 mm diameter has throat of 40 mm diameter. It is found that pressure in the pipe and at throat is 400 kPa and 130 kPa respectively velocity of the flow in the pipe is _____

34. In CNC machine interpolator controls

(A) Spindle speed

(B) Feed to tool

(C)

(D)

35. In machining operation if velocity doubled then the tool life reduced to (1/16 th) of initial value. Taylor's tool life index (n) for the a machining operation is _____

36. A column of length 1 m is hinged at both ends has cross section 10×20 mm^2. Young's modulus of elasticity of 200 GPa. The maximum permissible axial compressive load that can apply is____

37. Arc welding has linear power characteristic open circuit voltage 80 V and short circuit current 300A. For maximum power current must set to _____ in A.

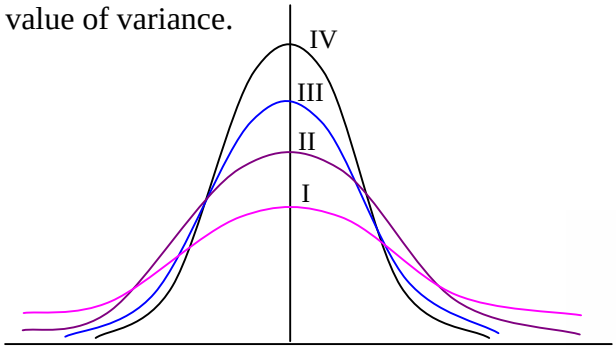
38. In arc welding process heat input per unit length is inversely proportional to

(A) Voltage (B) Current

(C) Welding velocity

(D) Cycle duty time

39. Four different normal distributions curve is shown in figure below which one has least value of variance.



(A) I (B) II (C) III (D) IV

41. A ball of mass 1 kg height 1 m fall freely on surface and 20 of velocity loot due to impact. After bounce back weight _____

42. In a pipe with constant flow rate, if diameter of pipe is halted and length of pipe is doubled then the head loss due to friction will be increased to by when amount of initial value.

(A) 4 (B) 16 (C) 64 (D) 32

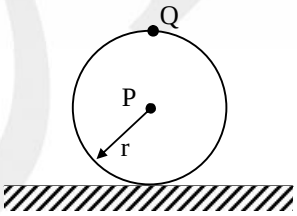
43. Using Simson's 1/3rd rule the value of $\int_0^1 \left(\frac{x^2}{2}+\frac{9}{5}\right)dx$ with minimum number of steps, is_____

44. In insulated turbine, expansion takes place isentropically from state 1 and 20% of mass bleed at 20 kPa and remaining expanded to state 3, 9 kPa. At state 1, m = 100 kg/s h_1 = ---- kJ/kg state 2, steam is dry saturated with h_2 = ---- kJ/kg and state 3, P = 9 kPa, h_f, h_g , s_f, s_g total work output of turbine is _____(in MW).

45. It inlet of diesel engine density of air is 1.2 kg/m^3 and mass flow rate is ----- kg/s) compression ratio of 16 air standard efficiency of cycle is _____

49. A vibrating system transmit 50% of vibrating force to the support, system has a small mass ---- kg place on pad, vibrates at frequency 60 rad/s. Natural frequency of vibration is so small. The stiffness of the spring that should added to the pad is _____ (N/m)

50. A disc is rolling on horizontal plan without sliping as shown. Point P has linear velocity 1 m/s then linear velocity of point Q is _____



51. If $a^2+b^2+c^2 = 1$, then ab +bc +ca lies in which interval

General Aptitude

01. Closely same meaning to word 'Awkward'
(A) Incet (B) Dreadful
(C) (D)

02. Ram and Ramesh attends interview for two vacancies in same department, Ram has probability of selection of 1/6 and Ramesh has 1/8, The probability of selection of either of them in interview is _____

03. Consider the following statements and conclusions given below
Statement:
(I) All film stars are playback singers
(II) All directors are film stars
Conclusion:
(I) All directors are playback singer
(II) Some of film stars are directors
Correct explanation is _____
(A) Only conclusion (I) follows
(B) Only conclusion II follows
(C) both conclusion follows
(D) None of them follows

04. A tiger is followings a deer, when tiger takes 5 leaps, dear takes 4 leaps. Tiger is 50 leaps of own behind to dear. Tiger's leap is 8 m and deer's one leap is 5 m. The distance travelled by the tiger before catching the deer (in m) is _____

05. A man travel along the steam in 5 hours and take 10 hours to travel same distance in opposite direction to stream. The velocity of man in steady stream is_____

06. Fill in the blanks
Dhoni as well as his team member _____ present at occasion.
(A) was (B) were
(C) has (D) have

NOTE: We don't claim the questions to be exact as given in GATE – 2015. The questions are based on memory of the students who appeared for the GATE – 2015 Exam.

***** Key will be uploaded very soon…**