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GATE – 2015 – Mechanical Engineering (ME)

(Questions Based on Memory of Students)

SET – 2 (01st Feb. Morning Session)

1 MARK QUESTIONS :

01. A, CD, GHI, ???, UVWXY
(A) MNOP (B) QRST
(C) KLMN (D) LMNO

02. Let us _____.
(A) Introvert (B) Alternate
(C) Atheist (D) Altruist

03. If the Athlete had wanted to come first in the case, he _____several hours everyday
(A) Should practice
(B) Should have practiced
(C) Practiced
(D) Should be practice

04. Connotation of a road or way
(A) Pertinacious (B) Viaticum
(C) Clandestine (D) Ravenous

05. x>y>1, which of the following must be true?
(i) lnx>lny (ii) e^x
(iii) $y^x>x^x$ (iv) cosx>cosy
(A) i and ii (B) i and iii
(C) iii and iv (D) ii and iv

06. The cylindrical Uranium fuel rod of radius 5 mm in a nuclear reactor is generating heat at the rate of $4\times10^7 W/m^3$. The rod is cooled by a liquid (convective heat transfer coefficient 1000 w/m^2-K at 25^0C. At steady state the surface temperature (in K) of the rod is
(A) 308 (B) 398 (C) 418 (D) 448

07. The values of function f(x) at 5 discrete points are given below :

x	0	0.1	0.2	0.3	0.4
f(x)	0	10	40	90	160

Using trapezoidal rule with step size of 0.1, the value of 0.1, the value of $\int_0^{0.4} f(x)dx$ *is* _____.

08. The initial velocity of an object is 40 m/s. The acceleration of the object is given by the following expression a= – 0.1V. Where V is instantaneous velocity of the object. The velocity of the object after 3 seconds will be _____

09. In a plane stress condition, the components of stress at a point are σ_x=20MPa, σ_y=80MPa and T_{xy}=40MPa. The maximum shear stress (in MPa) at the point is _____
(A) 20 (B) 25 (C) 50 (D) 100

10. One kg of air (R=287J/kg.K) undergoes an irreversible process between equilibrium state 1(20^0C, $0.9m^3$) and equilibrium state 2(20^0C, $0.6m^3$) the change in entropy S_2-S_1(in J/kg.K) is _____

11. In a rankine cycle, the enthalpies at turbine entry and outlet are 3159 kJ/kg and 2187 kJ/kg respectively. If the specific pump work is 20 kJ/kg, the specific stream consumption in (kg/Kw-h) of the cycle based on the net output is _____

12. In the laminar flower of air (Pr=0.7) over a heated plate, if δ and δ_1 denotes hydrodynamic and thermal boundary layer thickness respectively, then _____
(A) $\delta = \delta_t$ (B) $\delta > \delta_1$
(C) $\delta < \delta_t$ (D) $\delta=0, \delta_t \neq 0$

13. A gas is stored in acylindrical tank of inner radius and wall thickness 50m. The gauge pressure of the gas is 2MPa. The maximum shear stress (in MPa) in the wall is _____
(A) 35 (B) 70 (C) 140 (D) 280

14. Laplace transform of e^{i5t} where $i=\sqrt{-1}$ is
(A) $\frac{1}{s-5i}$ (B) $\frac{1}{s+5i}$
(C) $\frac{-1}{s-5i}$ (D) $\frac{-1}{s+5i}$

15. For the same values of peak pressure, peak temperature and heat rejection, the correct order of efficiency for otto, dual and diesel cycles is
(A) $\eta_{otto}>\eta_{dual}>\eta_{diesel}$
(B) $\eta_{otto}<\eta_{dual}<\eta_{diesel}$
(C) $\eta_{otto<}\eta_{dual}<\eta_{diesel}$
(D) $\eta_{otto}>\eta_{dual}>\eta_{diesel}$

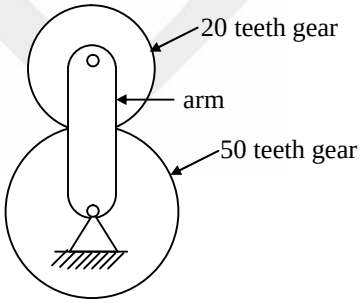
16. Which one of the following statement is true?
(A) NOGO gauge represents lower control limit in hole
(B) GO gauge represents lower control limit in hole
(C) NOGO gauge represents lower control limit in shaft
(D) GO gauge represents upper control limit in shaft

17. If the velocity for a potential flow is given by $v_{(x,y)}=u_{(x,y)}$ if $V_{(x,y)}$ with usual notation then the slope of the potential line at (x,y) is _____
(A) v/x (B) $-u/v$
(C) v^2/u^2 (D) u/v

18. At least one eigen value of a singular is
(A) positive (B) zero
(C) negative (D) imaginary

19. A rope brake dynamometer attached for the crank shaft IC engine measures a brake power of 10kw. When the speed of rotation of the shaft is 400 rad/s, the shaft torque (in N-m) sensed by the dynamometer is _____

20. The number of degrees of freedom of the planetary gear train is ___



(A) 0 (B) 1 (C) 2 (D) 3

21. COP of a Carnot heat pump operating between temperatures 6^0C & 37^0C is _____

22. In a spring mass system, the mass is 'm' and spring constant is K. The critical damping coefficient the system is to 0.1 kg/s. In another spring mass system, the mass is '2m' and the spring constant is 8K. The critical damping coefficient of the system (in kg/s) of this system is ___

23. For Rankine cycle with reheat, which of the following is true?
(i) increase in average temperature
(ii) reduction in thermal efficiency
(iii) drier steam at turbine exit
(A) only i, ii (B) ii, iii
(C) only i, iii (D) i, ii, iii

24. Vander walls equation of state is $\left(p+\frac{a}{v^2}\right)(v-b)$=RT.
SI unit of a is ____

25. Annual demand of a product is 50000 and ordering cost is 7000 Rs per order and EOQ is 10000 units. At optimum annual inventory holding cost is _____Rs.

26. A manufacturing technique in which the parts having similarities in Geometry, manufacturing process and/or functions are assembled together is
(A) Group Technology
(B) Cellular Layout
(C) Agile manufacturing
(D) Line Balancing

27. Which of the following statements are true regarding electrochemical machining?
(A) An electrolytic material removal process
(B) There is a tool wear
(C) Thermal or mechanical stresses will be transferred to the part
(D) None

28. Packing factor for BCC structure is (numerical type) ? _____

29. The value of tensile yield stress for a material is 300 mpa, then the value of shear yield stress (numerical)? _____

30. Principle mechanism of material removal in ECM?
(A) chemical corrosion
(B) ionic dissolution

TWO MARK QUESTIONS :

31. From a circular sheet of paper of radius 30 cm, a sector of 10% area is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and height of the cone is _____

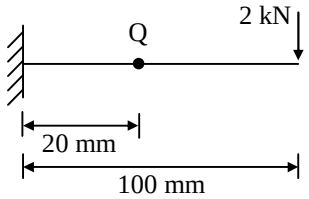
32. Question on Para jumbling

33. Ms. X will be in Bagdogora from 1/5/14 to 20/5/14 and from 22/5/14 to 31/5/14. On the morning of 21/5/14, she will reach Kochi via Mumbai.
(A) Ms. X will be in Kochi for only one day in May
(B) Ms. X will be in Kochi for one day only in May
(C) Ms. X will be only in Kochi for one day in May
(D) Ms. X will be in Kochi for one day in only May

34. log tan1^o + log tan2^o + --- +log tan89^o is____
(A) 1 (B) $1/\sqrt{2}$ (C) 0 (D) –1

35. Two friends would like to keep a secret between themselves. As per standard English, one of them will say
(A) It would remain between you and me
(B) It would remain between me and you
(C) It would remain between you and I
(D) It would remain between I and you

36. A cantilever beam with square cross section of 6mm side is subjected to a load of 2 kN normal to the top surface as shown in the figure. The young's modulus of elasticity of the material of the beam is 210 GPa. The magnitude of slope (in radian) at Q is_____



37. The surface integral $\iint_S \frac{1}{®}\left(9x_i - 3y_j\right)$ nds over the sphere given by $x^2+y^2+z^2$=Q is ____

38. In a certain slider crank mechanism, length of the crank and connection rod is equal. If the crank rotates with the uniform angular of 14 rad/sec and the crank length is 300 mm,

the maximum acceleration of the slider (in m/s^2) is _____

39. For fully developed laminar flow of water (dynamic viscosity 0.001 Pa-s) through a pipe of radius 5 cm, the axial pressure gradient is -10Pa/m. The magnitude of axial velocity (in m/s) at the radial location of 0.2 cm is _____

40. A single degree freedom springs mass system is subjected to a sinusoidal force of 10N amplitude and frequency ω along the axis of the springs. The stiffness of the springs is 150 N/m, damping factor is 0.2 and the undamped natural frequency 10ω. At steady state, the amplitude of vibration (in m) is approximately
(A) 0.05 (B) 0.07 (C) 0.7 (D) 0.9

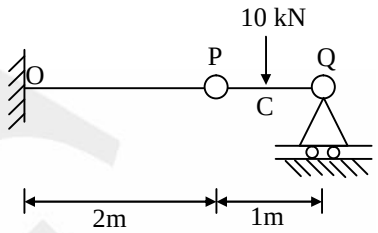
41. In a two stage wire drawn operation the fractional reduction (ratio of change in cross sectional area to initial cross sectional area) in the first stage 0.3. Overall reduction is _____
(A) 0.024 (B) 0.58 (C) 0.6 (D) 1

42. A balanced counter flow heat exchange has a surface area of $20m^2$ and overall heat transfer coefficient of 20 w/m^2. Air (C_P=1000 J/kg-K) entering at 0.4 kg/s and 280K is to be preheated by the air leaves the system at 0.4 kg/s and 280 K is to be preheated by the air leaves the system at 0.4 kg/s and 300K. The outlet temperature (in K) of the preheated air is
(A) 290 (B) 300 (C) 320 (D) 350

43. The initial velocity of an object is 40 m/s. The acceleration of the object is given by the following expression a=-0.1V. Where V is instantaneous velocity of the object. The velocity of the object after 3 seconds will be _____

44. The flow stress (in MPa) of a material is given by $\sigma=500\ \varepsilon^{0.1}$, where ε is true strain. The young's modulus of elasticity of the material is 200 GPa. A block of thickness 100 mm made of this material is compressed to 95 mm thickness and then the load is removed. The final dimension of the block (in mm) is _____

45.



C is midpoint of PQ. The magnitude of bending moment (in kN-m) at fixed end O is _____
(A) 2.5 (B) 5 (C) 10 (D) 25

46. A hollow shaft ($d_0 = 2d_1$,where d_0 & d_1 the outer and inner diameter respectively) needs to transmit 20kW power at 3000 rpm. If the maximum permissible shear stress is 30 MPa, d_0 is ____
(A) 11.29mm (B) 22.58mm
(C) 33.87mm (D) 25

47. Work is done on adiabatic system due to which its velocity changes from 10m/s to 20m/s, elevation increases by 40 m and temperature increases by 1K. The mass of the system is 16 kg, C_V=100J/(kg.K) and gravitational acceleration is $10m/s^2$. If there is no change in any other component of the energy of the system, the magnitude of total work done (in kJ) on the system is ____

48. A cube and a sphere made of cast iron (each of volume 1000 cm^3) were cast under identical conditions. The time taken for solidifying the cube was 4 seconds. The solidification time (in seconds) for the sphere is _____

49. The head loss of a laminar incompressible flow through a horizontal circular pipe is h_1. Pipe length and fluid remaining the same, if the average flow velocity doubles and the

pipe diameter reduces to half its previous value, the head loss is h_2. The ratio h_2/h_1 is
(A) 1 (B) 4 (C) 8 (D) 16

50. A manufacturer has the following date required a produces Fixed cost is 50000 Rs, variable cost is 200 Rs, Selling price is 300 Rs production capacity=1500 units per month. If the production is carried by at 80% of the rated capacity, the monthly profit(in Rs) is _____.

51. The chance of a student passing in a exam is 20%. The chance of a student passing in a exam and getting above 90% marks in it is 5%. Given that student passes the exam, the probability that student gets above 90% marks is
(A) 1/18 (B) 1/4
(C) 2/9 (D) 5/18

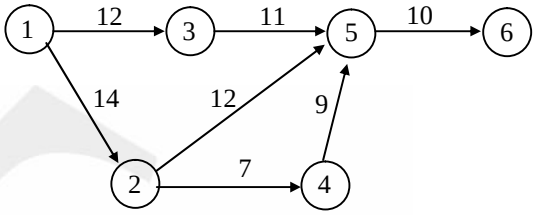
52. A single point cutting tool with 0^0 rake angle is used in an orthogonal matching process. At a cutting speed of 180m/min, the thrust force is 490N. If the coefficient of friction between the tool and the chip is 0.7, then the power consumption (in kW)for the machine operation is _____

53. A hollow shaft of 1m length is designed to transmit power of 30 kW at 700 rpm. The maximum permissible angle of twist in the shaft is 1^0. The inner diameter of the shaft is 0.7 times the outer diameter. The modules of rigidity is 80 GPa. The outside diameter (in mm) of the shaft is _____

54. The total emissive power of a surface is $500W/m^2$ at a temperature T_1 and 1200 W/m^2 at a temperature T_2, where the temperature are in Kelvin. Assume the emissivity of the surface to be constant, the ratio of the temperatures $\frac{T_1}{T_2}$ is _____.
(A) 0.308 (B) 0.416
(C) 0.8030 (D) 0.0874

55. At x=0, the function f(x)=$|x|$ has _____
(A) minimum (B) maximum
(C) point of inflection
(D) neither minimum nor maximum

56.

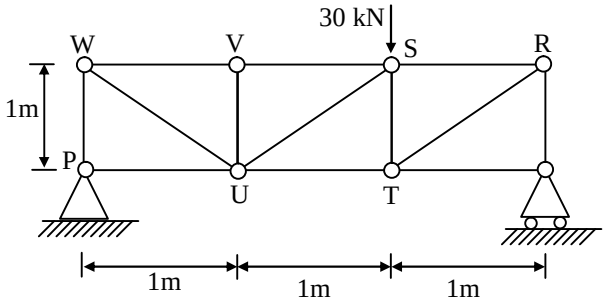


The minimum for completion of the project is _____

57. $\frac{dy}{dt} = -5y$; y=z; at t=0. If t=3; y=?
(A) $-5e^{-10}$ (B) $2e^{-10}$
(C) $2e^{-15}$ (D) $-15e^{-2}e^{-x}$

58. A pressure capacitance relaxation circuit is used in an electrical discharge machining process. The discharge voltage is 100V. At a spark cycle time of 25μs, the average power input required is 1 kW. The capacitance in μF in the circuit is ____
(A) 2.5 (B) 5 (C) 7.5 (D) 10

59. Find the magnitude of the force in (kN) in the member SR is



(A) 10 (B) 14 (C) 20 (D) 28

60. During a TIG welding process, the arc current and arc voltage were 50A and 60V, respectively, when the welding speed was 150 mm/min. In another process, the TIG welding is carried out at a welding speed of 120 mm/min at the same arc voltage and

heat input to the material so that weld quality remains the same. The welding current (in A) for this process is
(A) 40 (B) 44.72 (C) 55.9 (D) 62.65

61. The vendors were asked to supply a very high precision component. The respective probabilities of meeting the strict design specifications are 0.8, 0.7 and 0.5. Each vendor supplies one component. The probability that out of total three components supplied by the vendors, at least one will meet the design specifications is ____

62. The table represents number of units of demand.

Month	Jan	Feb	Mar	Apr	May
Number	10	11	16	19	25

Which of the following statements for sixth period estimated number of units is true?
(A) Regression value will be more than moving average value
(B) As the number of periods increase, the moving average will give a greater value
(C) Simple exponential smooth in will give more value than moving average
(D) Regression value will be less than moving average value

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…**