Answer Key MECHANICAL ENGINEERING

Q. No.	Answer
1.	A
2.	B
3.	A
4.	D
5.	B
6.	C
7.	B
8.	C
9.	A
10.	D
11.	D
12.	D
13.	D
14.	D
15.	C
16.	A
17.	B
18.	A
19.	A
20.	B
21.	B
22.	C
23.	B
24.	B
25.	D
26.	C
27.	C
28.	C
29.	D
30.	A
31.	C
32.	C
33.	A
34.	A
35.	B
36.	A
37.	D
38.	C
39.	B
40.	C

As received from examiner
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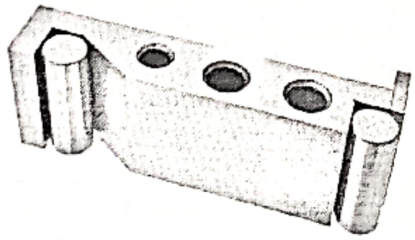
Ph.D. Entrance Examination of MECHANICAL ENGINEERING

S. No.	Question
1.	The angle between two forces when the resultant is maximum and minimum respectively are: A. 0° and 180° B. 180° and 0° C. 90° and 180° D. 90° and 0°
2.	The mechanical advantage of a lifting machine is the ratio of A. Distance moved by effort to the distance moved by load B. Load lifted to the effort applied C. Output to the input D. All of the above
3.	To design the trusses, which of the following rules is followed? A. The loads are applied at the joints B. The use of cables applies all the loads C. The loads are not applied at all to the joints D. All the loads are not applied at the joints
4.	A cantilever beam of length 2 m is subjected to a point load of 3 kN at a distance of 2 m and is subjected to a UDL of 3 kN/m for a total distance of 1.5 m from the fixed end. Calculate the shear force and bending moment at the fixed end. A. − 5.75 kN, − 5.545 kN - m B. − 10 kN, 15.254 kN - m C. − 12.5 kN, − 8.547 kN - m D. − 7.5 kN, − 9.375 kN - m
5.	A tensile test is performed on a round bar. After fracture, it has been found that the diameter remains approximately same at fracture. The material under test was A. Mild steel B. Cast iron C. Copper D. Aluminium
6.	The rotary internal combustion engine is the inversion of _____. A. Four bar link chain B. Double slider crank chain C. Single slider crank mechanism D. Rocker crank mechanism
7.	A minimum number of links that can make a mechanism are: A. 2 B. 3 C. 4 D. 5

8.	For a Whitworth quick return motion mechanism $\beta = 115°$. Find the ratio of time of cutting stroke to time of return stroke. A) 0.42 B) 0.44 C) 2.13 D) 2.37
9.	The locus of a point on the pitch circle from the beginning to end of engagement of two mating gears is called as: A. Arc of contact B. Path of contact C. path of approach D. Arc of approach
10.	Rayleigh's Energy method is based on which principle? A. Principle of conservation of mass B. Principle of conservation of momentum C. Principle of energy distortion D. Principle of conservation of energy
11.	The ratio of the maximum displacement of the forced vibration to the deflection due to the static force is known as A. Damping Factor B. Damping Coefficient C. Logarithmic Decrement D. Magnification Factor
12.	Critical speed of shaft is expressed as A. Speed of shaft when it gives maximum efficiency B. Rotation of shaft under maximum torsion C. Speed to transmit maximum power D. Natural frequency of shaft
13.	Which is not a possible type of failure in a riveted joint? A) Crushing failure of the plate B) Shear Failure of Rivet C) Tensile Failure of the Plate Between Rivets D) Shear Failure of Plate
14.	Out of the following Gears, which are used to connect two intersecting shafts A. Crossed helical gears B. Worm and Worm Wheel C. Spur gears D. Bevel Gears
15.	What is the other name for Stoke's boundary layer? A. Momentum boundary layer B. Atmospheric boundary layer C. Oscillatory boundary layer D. Thermal boundary layer

16.	In a one-dimensional steady-state heat conduction scenario, a rod of length L with thermal conductivity k experiences a temperature drop from T_1 to T_2 along its length. If the length of the rod is doubled and all other conditions remain unchanged, the new temperature gradient in the rod will be: A. Halved. B. Quadrupled. C. Unchanged. D. Doubled.
17.	What is the shape factor of hemispherical surface closed by a plane surface of diameter d? A) 0 B) 0.5 C) 1 D) 1.5
18.	What is the source temperature of the Carnot engine in K required to get 70% efficiency? Given sink temperature = 27 °C. A. 1000 K B. 90 K C. 270 K D. 727 K
19.	The universal gas constant (or molar constant) of a gas is the product of A. molecular mass of the gas and the gas constant B. atomic mass of the gas and the gas constant C. molecular mass of the gas and the specific heat at constant pressure D. molecular mass of the gas and the specific heat at constant volume
20.	A cylinder/piston contains 1kg methane gas at 100 kPa, 20°C. The gas is compressed reversibly to a pressure of 800 kPa. What is the work required if the process is isothermal? A. -116.0 kJ B. -316.0 kJ C. -216.0 kJ D. -416.0 kJ
21.	The Otto cycle consists of A) Two Reversible Isotherms And Two Reversible Isobars B) Two Reversible Isochores And Two Reversible Adiabatics C) Two Reversible Isotherms And Two Reversible Isochores D) Two Reversible Isobars And Two Reversible Adiabatics
22.	Which one of the following structures of steel is obtained due to rapid cooling from the austenite structure? A. Pearlite B. Cementite C. Martensite D. Troostite
23.	Which one of the following expands during solidification? A) Mild Steel B) Grey Cast Iron C) Wrought Iron D) Aluminium

24.	Which of the following is not a type of gate in foundry? A. Top Gate B. Blind Gate C. Bottom Gate D. Side Gate
25.	Which of the following metal forming process performs squeezing out of metal through a hole? A. Forging B. Rolling C. Drawing D. Extrusion
26.	Which of the following forming processes is suitable for making utensils and cup shaped objects? A) Forging B) Rolling C) Deep Drawing D) Extrusion
27.	Solder in an alloy of: A: Tin and silver B: Copper and Tin C: Tin and Lead D: Lead and copper
28.	The distribution of measured data can be studied by using A. X Chart B. R Chart C. Both X And R Chart D. None of The Above
29.	What is the name of this instrument?  A) Angle Dekkor B) Combination Set C) Autocollimator D) Sine Bar
30.	An assignment problem is a particular case of ..... A. Transportation Problem B. Assignment Problem C. Travelling Salesman Problem D. Replacement Problem

31.	The correct sequence of operations in the Production Planning and Control process is: A. Routing – Scheduling – Follow up – Dispatching B. Scheduling – Follow up – Dispatching – Routing C. Routing – Scheduling – Dispatching – Follow up D. Dispatching – Routing – Scheduling – Follow up
32.	'Buffer stock' is the level of stock A. Half of the actual stock B. At which the ordering process should start C. Minimum stock level below which actual stock should not fall D. Maximum stock in inventory
33.	Consider the following statements in respect of PERT and CPM: 1. PERT is event-oriented while CPM is activity-oriented. 2. PERT is probabilistic while CPM is deterministic. 3. Levelling and smoothing are the techniques related to resource scheduling in CPM. Which of the statements given above are correct? A. 1, 2 and 3 B. 1 and 2 only C. 2 and 3 only D. 1 and 3 only
34.	If the difference between the mode and median is 2, then find the difference between the median and mean. A. 1 B. 2 C. 3 D. 4
35.	Which of the following is also known as the Newton Raphson method? A) Chord Method B) Tangent Method C) Diameter Method D) Secant Method
36.	Find the Eigenvalue for the given matrix [P]. $P=\begin{bmatrix}4 & 1 & 3\\ 1 & 3 & 1\\ 2 & 0 & 5\end{bmatrix}$ A. 3 B. -3 C. 8 D. 7.3
37.	What is the maximum value of the function $f(x, y) = 3xy + 4x^2y^2$ in the region? $x=0; y=0; 2x + y = 2$ A) 1 B) 0 C) 100 D) 10

38.	If $f(t) = t^n$ where, 'n' is an integer greater than zero, then its Laplace Transform is given by? A) n! B) t^{n+1} C) $n!/s^{n+1}$ D) Does not exist
39.	Which of the following is **not** a necessary condition for Cauchy's Mean Value Theorem? A) The functions, f(x) and g(x) be continuous in [a, b] B) The derivation of g'(x) be equal to 0 C) The functions f(x) and g(x) be derivable in (a, b) D) There exists a value c $\in$ (a, b) such that, $f(b)-f(a)g(b)-g(a)=f'(c)g'(c)$
40.	Rank of the following Matrix [P] is: $P=\begin{bmatrix}3 & 2 & -1\\ 4 & 2 & 6\\ 7 & 4 & 5\end{bmatrix}$ A. 0 B. 1 C. 2 D. 3