

# PGCET-2022

Seat No. \_\_\_\_\_

SUB: MECHANICAL ENGINEERING

Time: 1 Hour 30 minutes

**Instructions:**

1. Ensure that all pages are printed.
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed

|    |  |                            |   |                  |
|----|--|----------------------------|---|------------------|
| 1. | Effect of a force on a body depends  |                            |   |                  |
|    | A  | magnitude                  | B | direction        |
|    | C  | line of action or position | D | all of above     |
| 2  | The unit of work or energy in S.I. units is  |                            |   |                  |
|    | A  | newton                     | B | joule            |
|    | C  | watt                       | D | Kilogram meter   |
| 3  | The possible loading in various members of framed structure are                        |                            |   |                  |
|    | A  | Compression or tension     | B | Shear or tension |
|    | C  | Bucking or shear           | D | Bending          |
| 4  | The co-efficient of friction depends upon  |                            |   |                  |
|    | A  | Nature of surface          | B | Area of contact  |
|    | C  | Shape of surface           | D | (a) And (b)      |
| 5  | The product of mass and velocity is known as   |                            |   |                  |
|    | A  | Work                       | B | Impulse          |
|    | C  | Moment                     | D | Momentum         |
| 6  | The ratio of shear modulus to modulus of elasticity if poisson's ratio is 0.25 will be |                            |   |                  |
|    | A  | 0.4                        | B | 0.25             |
|    | C  | 4                          | D | 0.5              |
| 7  | Torsional rigidity of a solid circular shaft of diameter 'd' is proportional to        |                            |   |                  |
|    | A  | d                          | B | $d^2$            |
|    | C  | $d^4$                      | D | $d/2$            |

|    |  |                                  |   |   |
|----|--|----------------------------------|---|---|
| 8  | Bending moment at any pint is equal to algebraic sum of                        |                                  |   |   |
|    | A  | All vertical forces              | B | Forces on either side of the point            |
|    | C  | All horizontal forces            | D | Moments of forces on either side of the point |
| 9  | Principal plane is one which carries   |                                  |   |   |
|    | A  | No shear stress                  | B | Maximum shear stress                          |
|    | C  | No normal stress                 | D | Maximum resultant of stress                   |
| 10 | The extremities of any diameter on Mohr's circle represent                     |                                  |   |   |
|    | A  | Principal stresses               | B | Shear stresses on planes at 45°               |
|    | C  | Normal stresses on planes at 45° | D | None of the above                             |
| 11 | If two moving elements have surface contact in motion such pair is known as    |                                  |   |   |
|    | A  | Sliding pair                     | B | Lower pair                                    |
|    | C  | Surface pair                     | D | Higher pair                                   |
| 12 | A slider crank chain consists of following number of turning and sliding pairs |                                  |   |   |
|    | A  | 3,1                              | B | 2,2   |
|    | C  | 1,3                              | D | 4,3   |
| 13 | Two system shall be dynamically equivalent when                                |                                  |   |   |
|    | A  | The mass of two are same         | B | M.I of two about an axis through C.G is equal |
|    | C  | C.G of two coincides             | D | All of above                                  |
| 14 | Cam size depends upon  |                                  |   |   |
|    | A  | Base circle                      | B | Pitch circle                                  |
|    | C  | Prime circle                     | D | Outer circle                                  |
| 15 | The ratio of numeric of teeth and pitch circle diameter is called              |                                  |   |   |
|    | A  | Pitch                            | B | Module  |
|    | C  | Diametral pitch                  | D | Circular pitch                                |
| 16 | An involute gear should have minimum of  |                                  |   |   |
|    | A  | 8 teeth                          | B | 12 teeth                                      |
|    | C  | 16 teeth                         | D | 32teeth                                       |

|    |   |  |   |   |
|----|---|--|---|---|
| 17 | The bulking load depends on   |  |   |   |
|    | A   | Cross sectional area                     | B | Modules of elasticity                     |
|    | C   | Slenderness ratio                        | D | All of above                              |
| 18 | A boiler plate thickness is 20mm. The rivet diameter will be                          |  |   |   |
|    | A   | 20 mm                                    | B | 10 mm                                     |
|    | C   | 40 mm                                    | D | 30 mm                                     |
| 19 | Factor of safety is the ratio of  |  |   |   |
|    | A   | Yield stress/working stress              | B | Tensile stress/working stress             |
|    | C   | Compressive stress/working stress        | D | Bearing stress/working stress             |
| 20 | The following type of nut is used with allen bolt                                     |  |   |   |
|    | A   | Allen nut                                | B | Hexagonal nut                             |
|    | C   | Slotted nut                              | D | Any one of above                          |
| 21 | One hertz equal to  |  |   |   |
|    | A   | 1 cycles per second                      | B | 1.5 cycles per second                     |
|    | C   | 2 cycles per second                      | D | 2.5 cycles per second                     |
| 22 | Identify a forced vibration   |  |   |   |
|    | A   | Pulling a child back on a swing          | B | Vibration of a building due to earthquake |
|    | C   | Vibration of a vehicle on an uneven road | D | All of above                              |
| 23 | Damping force is proportional to the  |  |   |   |
|    | A   | Displacement                             | B | Velocity                                  |
|    | C   | Acceleration                             | D | None                                      |
| 24 | What is the effect of rotating mass of a shaft on a system?                           |  |   |   |
|    | A   | Bending the shaft                        | B | Break the shaft                           |
|    | C   | Compress the shaft                       | D | Extend the shaft                          |
| 25 | At which angle primary unbalanced force in reciprocating engine mechanism is maximum? |  |   |   |
|    | A   | 180°                                     | B | 45°                                       |
|    | C   | 0°                                       | D | 90°                                       |

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| 26 | Kinematic of viscosity is depend on   |   |   |  |
|    | A   | Density                                   | B | Velocity                                     |
|    | C   | Flow                                      | D | Pressure                                     |
| 27 | The unit of dynamic or absolute viscosity are   |   |   |  |
|    | A   | Meters <sup>2</sup> / sec                 | B | Newton-sec / Meters <sup>2</sup>             |
|    | C   | Kg sec / meter                            | D | None of the above                            |
| 28 | If the particles of a fluid attain such velocity that velocity vary from point to point in magnitude and direction as well as from instant to instant, the flow is said to be |   |   |  |
|    | A   | Disturbed flow                            | B | Turbid flow                                  |
|    | C   | Turbulent flow                            | D | Non steady flow                              |
| 29 | Any fluid flow follows  |   |   |  |
|    | A   | Continuity equation                       | B | Bernoulli's equation                         |
|    | C   | Newton's law of viscosity                 | D | Darcy's equation                             |
| 30 | Rota meter is used to measure   |   |   |  |
|    | A   | Rotation                                  | B | Viscosity                                    |
|    | C   | Flow                                      | D | Velocity                                     |
| 31 | Heat transfer takes place as per  |   |   |  |
|    | A   | First law of thermodynamics               | B | Second law of thermodynamics                 |
|    | C   | Third law of thermodynamics               | D | Fourth law of thermodynamics                 |
| 32 | Total heat is the heat required to  |   |   |  |
|    | A   | Change vapour into liquid                 | B | Change liquid into vapour                    |
|    | C   | Convert water into steam and superheat it | D | Convert saturated steam into dry steam       |
| 33 | Thermal diffusivity is  |   |   |  |
|    | A   | A dimensionless parameter                 | B | Physical property of material                |
|    | C   | Used as a mathematical model              | D | Useful in case of heat transfer by radiation |
| 34 | Emissivity of a white polished body in comparison to a black body is  |   |   |  |
|    | A   | Lower                                     | B | Higher                                       |
|    | C   | Same                                      | D | Depends upon the shape of the body           |

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| 35 | LMTD in case of counter flow heat exchanger as compared to parallel flow heat exchanger       |                                       |   |  |
|    | A   | Lower                                 | B | Higher                                     |
|    | C   | Depends on temperature conditions     | D | Depends on the area of heat exchanger      |
| 36 | At thermal equilibrium  |                                       |   |  |
|    | A   | Absorptivity is equal to emissivity   | B | Absorptivity is higher than emissivity     |
|    | C   | Absorptivity is lower than emissivity | D | Sum of absorptivity and emissivity s unity |
| 37 | Heat energy stored in the gas and used for raising temperature of a gas is known as           |                                       |   |  |
|    | A   | thermal energy                        | B | enthalpy                                   |
|    | C   | internal energy                       | D | molecular energy                           |
| 38 | Minimum work in compressor is possible when the value of adiabatic index $\gamma$ is equal to |                                       |   |  |
|    | A   | 0.75                                  | B | 2  |
|    | C   | 1                                     | D | 1.35                                       |
| 39 | Gas laws are applicable to  |                                       |   |  |
|    | A   | Gases as well as vapour               | B | Gases and steam                            |
|    | C   | Gases alone and not to vapour         | D | steam and vapour                           |
| 40 | The first law of thermodynamics is the law of   |                                       |   |  |
|    | A   | conversion of mass                    | B | conversion of energy                       |
|    | C   | conversion of heat                    | D | conversion of temperature                  |
| 41 | The specific heat of air increases with increase in   |                                       |   |  |
|    | A   | temperature                           | B | pressure                                   |
|    | C   | Air flow                              | D | both temperature and pressure              |
| 42 | The maximum temperature in the I. C. cylinder is of the order of                              |                                       |   |  |
|    | A   | 500-1000°C                            | B | 2500-3000°C                                |
|    | C   | 1500-2000°C                           | D | 2000-2500°C                                |
| 43 | The automobile generally utilize batteries having voltage of                                  |                                       |   |  |
|    | A   | 3V                                    | B | 6V   |
|    | C   | 12 V                                  | D | 24V  |

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| 44 | Thermal efficiency of a thermal power plant is of the order of |                                  |   |                                   |
|    | A  | 15%                              | B | 45%                               |
|    | C  | 30%                              | D | 20%                               |
| 45 | Chemical formula of Freon 12 is                                |                                  |   |                                   |
|    | A  | $\text{C Cl}_2 \text{ F}_2$      | B | $\text{C Cl}_2 \text{ F}_3$       |
|    | C  | $\text{C Cl}_3 \text{ F}_2$      | D | $\text{C Cl F}_2$                 |
| 46 | In a vapour compression cycle the lowest temperature occurs in |                                  |   |                                   |
|    | A  | Receiver                         | B | Condenser                         |
|    | C  | Evaporator                       | D | Expansion valve                   |
| 47 | Dry bulb temperature depends on                                |                                  |   |                                   |
|    | A  | Humidity of air                  | B | Water vapour content of air       |
|    | C  | Condition of air                 | D | None of above                     |
| 48 | Air fuel ratio of gas turbine is closer to                     |                                  |   |                                   |
|    | A  | 10:1                             | B | 60:1                              |
|    | C  | 20:1                             | D | 15:1                              |
| 49 | In taper roller bearing the contact angle is                   |                                  |   |                                   |
|    | A  | Between $5^\circ$ and $10^\circ$ | B | Between $12^\circ$ and $15^\circ$ |
|    | C  | Between $1^\circ$ and $3^\circ$  | D | Zero                              |
| 50 | Oil consumption excessive                                      |                                  |   |                                   |
|    | A  | Piston rings worn out            | B | Valve timing defective            |
|    | C  | Lubricating oil level too high   | D | Leaks at gaskets or seals         |
| 51 | Melting point of iron is                                       |                                  |   |                                   |
|    | A  | $1539^\circ \text{C}$            | B | $1131^\circ \text{C}$             |
|    | C  | $1712^\circ \text{C}$            | D | $1601^\circ \text{C}$             |
| 52 | Which of the following is the most ductile material            |                                  |   |                                   |
|    | A  | Mild steel                       | B | Aluminum                          |
|    | C  | Zinc                             | D | Nickel                            |

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| 53 | Which of the following constituents of steels is softest and least strong  |  |   |   |
|    | A  | Austenite                                    | B | Pearlite  |
|    | C  | Ferrite                                      | D | Cementite   |
| 54 | The hardening strains are reduced and the toughness of the part increased by the following process after hardening |  |   |   |
|    | A  | Annealing                                    | B | Tempering   |
|    | C  | Normalizing                                  | D | Case hardening  |
| 55 | Which of the following casting methods utilizes wax pattern  |  |   |   |
|    | A  | Investment casting                           | B | Slush casting   |
|    | C  | Shell casting                                | D | Die casting   |
| 56 | Which of the following materials has more shrinkage allowance  |  |   |   |
|    | A  | Cast iron                                    | B | Lead  |
|    | C  | Steel  | D | Aluminum alloy  |
| 57 | The purpose of gate is to  |  |   |   |
|    | A  | Act as reservoir for molten metal            | B | Feed the casting at a rate consistent with the rate of solidification |
|    | C  | Feed molten metal from pouring basin to gate | D | None of above   |
| 58 | Electrode gets consumed in the flowing welding process   |  |   |   |
|    | A  | Gas  | B | Resistance  |
|    | C  | TIG  | D | Arc   |
| 59 | Binding wire used to support the joints for soldering is made of   |  |   |   |
|    | A  | Aluminum                                     | B | Tin   |
|    | C  | Copper                                       | D | Soft iron   |
| 60 | Seam welding is  |  |   |   |
|    | A  | Arc welding                                  | B | TIG welding   |
|    | C  | Resistance welding                           | D | Arc welding with reverse polarity                                     |

|    |  |                             |   |                              |
|----|--|-----------------------------|---|------------------------------|
| 61 | Oxygen to acetylene ratio in case of neutral flame is                            |                             |   |                              |
|    | A  | 0.8:1.0                     | B | 1:1                          |
|    | C  | 1.2:1                       | D | 2:1                          |
| 62 | Clearance in mm =  |                             |   |                              |
|    | A  | $C = 0.0032t \sqrt{fs}$     | B | $C = 0.0023t \sqrt{fs}$      |
|    | C  | $C = 0.023t \sqrt{fs}$      | D | $C = 0.032t \sqrt{fs}$       |
| 63 | Find incorrect press name.   |                             |   |                              |
|    | A  | screw press                 | B | cam press                    |
|    | C  | guide press                 | D | eccentric press              |
| 64 | Shearing force $F = L t f_s$ , where L is  |                             |   |                              |
|    | A  | area                        | B | perimeter                    |
|    | C  | volume                      | D | mass                         |
| 65 | How many punch and die sets in progressive die?                                  |                             |   |                              |
|    | A  | 1                           | B | 2                            |
|    | C  | 0                           | D | None of above                |
| 66 | MUF in presswork is used for   |                             |   |                              |
|    | A  | Material Utilization Factor | B | Mass Utilization Factor      |
|    | C  | Material Utilization Force  | D | Machining Utilization Factor |
| 67 | _____ is the locating system of cube.  |                             |   |                              |
|    | A  | 3-2-1                       | B | 1-2-3                        |
|    | C  | 2-3-1                       | D | 3-1-2                        |
| 68 | $T_1/T_2 = L_2/L_1$ of chip formation is possible because of assumption as ____. |                             |   |                              |
|    | A  | $B_1 < B_2$                 | B | $B_1 > B_2$                  |
|    | C  | $B_1 = B_2$                 | D | $B_1 * B_2 = 1$              |
| 69 | Which is the most important process parameters in AJM                            |                             |   |                              |
|    | A  | Nozzle material             | B | Nozzle distance from job     |
|    | C  | Nozzle color                | D | Nozzle shape                 |



|    |   |   |                                     |
|----|---|---|-------------------------------------|
| 70 | _____ is not a laser.   |   |                                     |
|    | A   | Ruby  | B Nd glass                          |
|    | C   | CO2   | D Pm glass                          |
| 71 | Which is tool life equation.  |   |                                     |
|    | A   | $VT^n=C$  | B $CT^n=V$                          |
|    | C   | $CT^n=V$  | D $T=CV^n$                          |
| 72 | Graphical method, simplex method and transportation method are concerned with |   |                                     |
|    | A   | Queing theory                                   | B Liner programing                  |
|    | C   | Material handling                               | D Break even analysis               |
| 73 | Routing is essential in the following type of industry                        |   |                                     |
|    | A   | Process industry                                | B Job order industry                |
|    | C   | Assembly industry                               | D Mass production industry          |
| 74 | PERT has following time estimate  |   |                                     |
|    | A   | One time estimate                               | B Three time estimate               |
|    | C   | Two time estimate                               | D Nil time estimate                 |
| 75 | EOQ is  |   |                                     |
|    | A   | Economical order quantity                       | B Extra order quantity              |
|    | C   | Equal order quantity                            | D None of above                     |
| 76 | Rotary encoder is   |   |                                     |
|    | A   | Feedback device at CNC                          | B Device at rotary pump             |
|    | C   | Coding device at EDM                            | D None of above                     |
| 77 | Surface modeling is at  |   |                                     |
|    | A   | Surface inspection                              | B Surface masking                   |
|    | C   | CAD modeling                                    | D None of above                     |
| 78 | Why tolerance are given to the parts?   |   |                                     |
|    | A   | Because it's impossible to make perfect setting | B To reduce weight of component     |
|    | C   | To reduce cost of assembly                      | D To reduce amount of material used |

|     |  |   |   |   |
|-----|--|---|---|---|
| 79  | Quality control chart doesn't depend on which factors?   |   |   |   |
|     | A  | Normal distribution                                   | B | Binomial distribution                               |
|     | C  | Random sampling                                       | D | Independence between sample                         |
| 80  | Go 'limit' applied to which limit condition?   |   |   |   |
|     | A  | Maximum material limit                                | B | Lower limit of shaft and upper limit of hole        |
|     | C  | Minimum material limit                                | D | Moderate material limit                             |
| 81. | Solution of differential equation $x^2 \frac{dy}{dx} + 2xy = x^2$ is given by.   |   |   |   |
|     | A  | $y = \frac{x^3}{3} + c$                               | B | $yx^2 = x + c$                                      |
|     | C  | $yx^2 = \frac{x^3}{3} + c$                            | D | $y = \frac{x^2}{3} + c$                             |
| 82. | Solution of differential equation $\frac{d^2y}{dx^2} - 15\frac{dy}{dx} + 54y = e^{2x}$ is given by.  |   |   |   |
|     | A  | $y = c_1 e^{-9x} + c_2 e^{-6x} + \frac{1}{28} e^{2x}$ | B | $y = c_1 e^{9x} + c_2 e^{6x} + \frac{1}{28} e^{2x}$ |
|     | C  | $y = c_1 e^{-9x} + c_2 e^{-6x} + e^{2x}$              | D | $y = c_1 e^{9x} + c_2 e^{6x} + e^{2x}$              |
| 83. | Laplace Transformation of $t \sin 7t$ is equal to.   |   |   |   |
|     | A  | $\frac{14s}{(s^2 + 7)}$                               | B | $\frac{s}{(s^2 + 7)^2}$                             |
|     | C  | $\frac{14s}{(s^2 + 49)^2}$                            | D | $\frac{14s}{(s^2 + 7)^2}$                           |
| 84. | Inverse Laplace Transformation of $\frac{s}{(s^4 + s^2)}$ is equal to  |   |   |   |
|     | A  | $1 - \cos t$  | B | $t - \cos t$  |
|     | C  | $t \cos t$  | D | $1 - \sin t$  |
| 85. | $\lim_{x \rightarrow 0} \frac{2 \sin x - \sin 2x}{x^3}$ is equal to.   |   |   |   |
|     | A  | 0   | B | $\frac{1}{2}$                                       |
|     | C  | 2   | D | 1   |
| 86. | If $U = \cos^{-1} \left( \frac{x^2 + y^2}{x - y} \right)$ then $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y}$ is equal to |   |   |   |
|     | A  | $\sin U$  | B | $\cos U$  |

|     |  |  |   |                               |
|-----|--|--|---|-------------------------------|
|     | C  | $-\cot U$                                | D | $3U$                          |
| 87. | Vector Field $\vec{F} = 5zi + 6j + 5xk$ is   |  |   |                               |
|     | A  | Irrotational and Solenoidal vector field | B | Irrotational vector field     |
|     | C  | Solenoidal vector Field                  | D | None of these                 |
| 88. | What is the work done when force $\vec{F} = (2xy + z^3)i + x^2j + 3xz^2k$ moves particle from point (1,-2,1) to (3,1,4)? ( $\vec{F}$ is a conservative vector field) |  |   |                               |
|     | A  | 100                                      | B | 200                           |
|     | C  | 101                                      | D | 202                           |
| 89. | Which of the following is correct for the system<br>$x - y + 2z = 4, \quad 3x + y + 4z = 6, \quad x + y + z = 1$   |  |   |                               |
|     | A  | Unique solution                          | B | Infinitely many solutions     |
|     | C  | System is consistence                    | D | None of(A), (B) and (C) holds |
| 90. | If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 5 & 1 \\ 0 & 0 & 3 \end{bmatrix}$ then an Eigen values of $A^{-1}$ are  |  |   |                               |
|     | A  | 1,9,25                                   | B | 1,3,5,                        |
|     | C  | $\frac{1}{3}, \frac{1}{5}, \frac{1}{2}$  | D | $1, \frac{1}{3}, \frac{1}{5}$ |
| 91. | If $A = \begin{bmatrix} 12 & 24 & 36 \\ 6 & 12 & 18 \\ 3 & 6 & 9 \end{bmatrix}$ then rank of the matrix is.  |  |   |                               |
|     | A  | 1  | B | 0                             |
|     | C  | 2  | D | 3                             |
| 92. | If $f(z) = \frac{z^2 - 1}{(z-3)(z^2 - 2z + 1)}$ which is the points where $f(z)$ fails to be analytic ?  |  |   |                               |
|     | A  | 1,2                                      |   | 1,3                           |
|     | C  | -1,-3                                    |   | 1,-3                          |
| 93. | Value of $\int_c \frac{z}{z-1} dz$ , ( where $c$ is $ z  = 2$ ) is equal to.   |  |   |                               |
|     | A  | 0  | B | $\pi i$                       |
|     | C  | $3\pi i$                                 | D | $2\pi i$                      |
| 94. | Residue of $f(z) = \frac{z^2}{(z+1)(z+3)}$ at pole -1 is equal to.   |  |   |                               |

|      |   |                             |   |                              |
|------|---|-----------------------------|---|------------------------------|
|      | A   | -2                          | B | $\frac{1}{2}$                |
|      | C   | 2                           | D | 1                            |
| 95.  | What is the Mean, Median and mode of 10, 12, 13, 5, 10 are.   |                             |   |                              |
|      | A   | Mean=10, Median=5, Mode= 5  | B | Mean=5, Median=10, Mode= 5   |
|      | C   | Mean=10, Median=5, Mode= 10 | D | Mean=10, Median=10, Mode= 10 |
| 96.  | In a bolt manufacturing company. It is found that there is a small chance 0.05 for any bolt to be defective. What is the Mean and Standard deviation of the binomial distribution of defective bolt in a total of 1000 ?. |                             |   |                              |
|      | A   | 50, 8.69                    | B | 50, 9                        |
|      | C   | 50, 6.89                    | D | 50, 9.68                     |
| 97.  | There are 5 yellow, 2 red and 3 white balls are in the box. Three balls are randomly selected from the box. What is the probability that all are of same colour ?   |                             |   |                              |
|      | A   | 0.09                        | B | 0.91                         |
|      | C   | 0.069                       | D | 0.08                         |
| 98.  | Value of $\int_0^5 \frac{1}{5+4x} dx$ with $h = 0.5$ by Simpsons $\frac{1}{3}$ rule is.   |                             |   |                              |
|      | A   | 0.2046                      | B | 0.6423                       |
|      | C   | 0.4026                      | D | 0.2506                       |
| 99.  | Using Newton- Raphson method what is the value of $\sqrt{10}$ , correct upto two decimal places.  |                             |   |                              |
|      | A   | 3.61                        | B | 3.162                        |
|      | C   | 3.71                        | D | 3.29                         |
| 100. | The area enclosed by the curve $r = a(1 - \cos\theta)$ is given by  |                             |   |                              |
|      | A   | $8a^2$                      | B | $2\pi a^2$                   |
|      | C   | $4a^2$                      | D | $\pi a^2$                    |