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# KPCL AE

**Previous Year Paper**  
**(Mechanical)**  
**18 Feb, 2024**



**AME**

Each question carries one mark.

(100 × 1 = 100)

1. Bulk modulus of elasticity of fluid is defined as ratio of compression stress to
  - (A) Temperature
  - (B) Volumetric strain
  - (C) Pressure
  - (D) Kinematic viscosity
  
2. Difference in pressure between two points is measured by the instrument
  - (A) Manometer
  - (B) Barometer
  - (C) Piezometer
  - (D) Differential manometer
  
3. The pressure at which the valve opens is known as
  - (A) Cracking pressure
  - (B) Reduced pressure
  - (C) System pressure
  - (D) Fluid pressure
  
4. Hydraulic accumulator is used to
  - (A) Open the pressure relief valve
  - (B) Store the potential energy of incompressible fluid held against some dynamic force
  - (C) Store the fluid without undergoing chemical reaction
  - (D) Close the hydraulic motor operation
  
5. A hydraulic turbine develops a power of 104HP power while running at a speed of 100 rpm, under a head of 40m. Its specific speed is nearest to
  - (A) 100
  - (B) 628
  - (C) 523
  - (D) 314

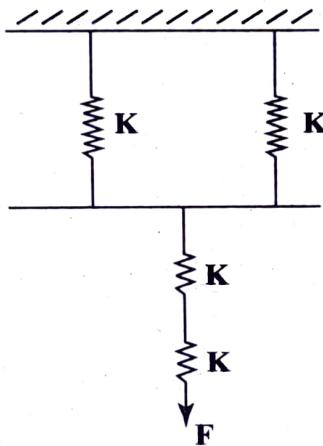
**A2**

6. The degree of reaction of a turbine is defined as the ratio of
  - (A) Static pressure drop to total energy transfer
  - (B) Total energy transfer to static pressure drop
  - (C) Change of velocity energy across the turbine to total energy transfer
  - (D) Velocity energy to pressure energy
7. In reaction turbine, the draft tube is used to
  - (A) Transport water to downstream without eddies
  - (B) Increase the effective head
  - (C) Reconvert kinetic energy to flow energy by a gradual expansion of the flow cross-section
  - (D) Prevent air from entering
8. Francis Turbine is best suited for
  - (A) High head above 180m
  - (B) Medium head from 24m to 180m
  - (C) Low head from 5m to 30m
  - (D) Low head below 5m
9. Which of the following is TRUE for vibration of a mechanical system?
  - (A) Damping ratio is the ratio of the critical damping to the actual damping.
  - (B) The damping can be obtained from the response of the system under forced vibration using logarithmic decrement method.
  - (C) For damped mechanical systems, the amplitude of vibration tends to become infinity when excitation frequency reaches the system's natural frequency.
  - (D) Amplitude ratio and transmissibility of a vibration isolator is unity when the frequency of exciting force is  $\sqrt{2}$  times the natural frequency.
10. A mass of 2kg is hung from the ceiling by a helical spring. When hung, the spring suffers an extension of 100mm. If the mass is slightly displaced downward and released, it will oscillate at a frequency of (Take  $g = 10 \text{ m/Sec}^2$ )
  - (A) 1.6 Hz
  - (B)  $\sqrt{50}$  Hz
  - (C) 10 Hz
  - (D) 50 Hz

11. When there is a reduction in the amplitude for every cycle of vibration then the body is said to be in \_\_\_\_\_

- (A) Forced vibration
- (B) Undamped vibration
- (C) Free vibration
- (D) Damped vibration

12. For the spring system given in the figure, the equivalent stiffness is



- (A) 0.4 K
- (B) 4 K
- (C) 2.5 K
- (D) K

13. The damping force is constant in magnitude but opposite in direction to that of motion of vibrating bodies in case of

- (A) Viscous damping
- (B) Coulomb damping
- (C) Slip damping
- (D) Structural damping

14. All radiations in a black body are:

- (A) Reflected
- (B) Refracted
- (C) Transmitted
- (D) Absorbed

15. The heat is transformed by conduction, convection and radiation in

- (A) Melting of ice
- (B) Boiler furnaces
- (C) Condensation of steam in condenser
- (D) None of these

16. The amount of heat flow through a body by conduction is

- (A) Directly proportional to the surface area of the body
- (B) Directly proportional to the temperature difference on the two faces of the body
- (C) Dependent upon the material of the body
- (D) All of the above

17. Which of the following has least value of conductivity?

- (A) Glass
- (B) Water
- (C) Plastic
- (D) Air

18. What is the function of transducer in a measurement system?

- (A) Amplify signals
- (B) Convert physical quantities to electrical signals
- (C) Process data
- (D) Display results

19. The term 'resolution' in a measurement system refers to \_\_\_\_\_

- (A) The smallest change in input that produces a noticeable change in output
- (B) The speed of the measurement process
- (C) The accuracy of the measurement
- (D) The cost of the measuring instrument

20. The term "hysteresis" in a measurement system refers to

- (A) The delay between the input and output
- (B) The non-linearity of the system
- (C) The stability of the system
- (D) The repeatability of the measurements

21. What is the property of ability of the sensor to indicate the same output over a period of time for a constant input?

- (A) Stability
- (B) Repeatability
- (C) Accuracy
- (D) Impedance

22. CNC stand for with respect to machine related manufacturing

- (A) Computer Network control
- (B) Computer Number control
- (C) Computer Numerical control
- (D) Computerized Numerical control

23. Which software cannot be used for 3D modelling and computer aided design?

- (A) Creo
- (B) Ansys
- (C) Blender
- (D) Adobe premium pro

24. How many degree of freedom do an industrial delta robot has?

- (A) 3
- (B) 5
- (C) 7
- (D) 9

25. Which of the following code is used to return to a reference point?

- (A) G23
- (B) G28
- (C) G14
- (D) G19

26. Which of the following is correct sequence of the crystal structure with respect to percentage of voids?

- (A) SCC < FCC < BCC
- (B) FCC < BCC < SCC
- (C) SCC < BCC < FCC
- (D) None of the above

A2

27. The crystal structure of Aluminium is \_\_\_\_\_  
(A) Body-centered cubic  
(B) Body-centered tetragonal  
(C) Face-centered cubic  
(D) Hexagonally close-packed

28. The power-law relation is used to describe the \_\_\_\_\_  
(A) Creep elongation  
(B) Creep mechanism  
(C) Creep rate  
(D) fracture behaviour

29. How many types of systems are applicable for phase diagrams?  
(A) One  
(B) Two  
(C) Three  
(D) Four

30. Equilibrium conditions are obtained by minimizing \_\_\_\_\_  
(A) Kinetic energy  
(B) Force  
(C) Potential energy  
(D) Load

31. In elimination approach which elements are eliminated from a matrix?  
(A) Force  
(B) Load  
(C) Rows and Column  
(D) Undefined

32. The equation for principle of minimum potential energy is expressed as  
(A)  $[K] \{F\} = \{U\}$   
(B)  $\{F\} \{U\} = [K]$   
(C)  $[K] \{U\} = \{F\}$   
(D)  $[K] \{U\} \{F\} = 1$

33. Production management starts with  
(A) Aggregate planning  
(B) Average planning  
(C) Strategy formulation  
(D) None of the above



34. \_\_\_\_\_ is not one of the eight steps in the decision-making process

- (A) Analyzing alternative solutions
- (B) Identifying the problem
- (C) Delegating the decision-making
- (D) Implementing the decision

35. Which one of the following is the simple and easiest method of forecasting?

- (A) Exponential smoothing
- (B) Moving average method
- (C) Regression
- (D) Extrapolation

36. The measure reserve capacity process has to handle in unexpected increases in demand is the

- (A) Capacity utilization rate
- (B) Capacity cushion
- (C) Capacity bottleneck
- (D) Capacity constraint limit

37. A system comprising a single phase, is known as

- (A) open system
- (B) closed system
- (C) homogeneous system
- (D) heterogeneous system

38. The Carnot cycle consists of two adiabatic processes and

- (A) two isothermal processes
- (B) two constant pressure processes
- (C) two constant volume processes
- (D) one constant pressure processes

39. According to Kelvin-Plank's statement, a perpetual motion machine of

- (A) first kind is possible
- (B) first kind is impossible
- (C) second kind is impossible
- (D) second kind is possible

40. In all reversible process, entropy of the system

- (A) increases
- (B) decreases
- (C) remains same
- (D) zero

41. Universal surface gauge is used for

- (A) checking straightness
- (B) checking flatness
- (C) checking parallelism
- (D) layout work and inspection

42. Repeatability of measuring equipment is

- (A) the closeness with which a measurement can be read directly from a measuring instrument
- (B) a measure of how close the reading is to be true size
- (C) difference between measured value and actual value
- (D) the capability to indicate the same reading again and again for a given measurand

43. Systematic errors are

- (A) randomly distributed
- (B) regularly repetitive in nature
- (C) distributed on both positive and negative sides of mean value
- (D) unpredictable

44. V-block is used in the workshop to check

- (A) roundness of a cylindrical work
- (B) surface roughness
- (C) taper on a job
- (D) pitch of a screw

45. The ultimate point and breaking point are one and the same for the following type of materials

- (A) Ductile materials
- (B) Brittle materials
- (C) Composite materials
- (D) Rubber materials

46. A circular rod of diameter 20 mm and 500 mm long is subjected to a tensile load of 45 kN. If the Young's modulus is  $2 \times 10^5$  N/mm<sup>2</sup>, then the Elongation of the bar is  
(A) 0.264 mm  
(B) 0.048 mm  
(C) 0.567 mm  
(D) 0.358 mm

47. The ratio of shearing stress to shearing strain is known as  
(A) Modulus of rigidity  
(B) Modulus of elasticity  
(C) Bulk Modulus of elasticity  
(D) Poisson's ratio

48. A steel rail is 12.6 m long and is laid at a temperature of 24°C. If the temperature is raised to 44°C, the free expansion of the rail for a co-efficient of thermal expansion to be  $12 \times 10^{-6}/^{\circ}\text{C}$   
(A) 4.042 mm  
(B) 5.068 mm  
(C) 0.0268 mm  
(D) 3.024 mm

49. If there are 'L' number of links in a mechanism, then the number of possible inversions are equal to  
(A)  $L + 1$   
(B)  $L - 1$   
(C)  $L$   
(D)  $L + 2$

50. A point on a link connecting double slider crank chain traces the following  
(A) straight line  
(B) circle  
(C) hyperbola  
(D) ellipse

51. If the mechanism has 'n' number of links, then the total number of instantaneous centre is given by  
(A) n  
(B)  $\frac{n(n-1)}{2}$   
(C)  $n - 1$   
(D)  $\frac{n}{2}$

52. Cam size depends on the following

- (A) Base circle
- (B) Pitch circle
- (C) Prime circle
- (D) Outer circle

53. Feedback element is the feature of the following type of control systems

- (A) closed loop type of control systems
- (B) open loop type of control systems
- (C) hydraulic open loop type of systems
- (D) pneumatic open loop type of systems

54. In the modelling of electrical and mechanical analogous systems, for a force-current analogy, the capacitance is analogous to

- (A) Friction
- (B) Mass
- (C) Damping
- (D) Velocity

55. When the system is excited by a step input of magnitude 'A', then for Type 1 system, the steady state error is

- (A) 1
- (B) Zero
- (C) Infinity
- (D) 0.5

56. Rise time in a transient response of a control system is the time required by the response to reach

- (A) 0 to 100% of its final value for overdamped systems
- (B) 0 to 50% of its final value for underdamped systems
- (C) 10 to 90% of the final value for overdamped systems
- (D) 10 to 50% of the final value for underdamped systems

57. If ' $G_1$ ' and ' $G_2$ ' are the transfer function of two blocks which are connected in series, then the transfer function for the whole system is

- (A)  $G_1 + G_2$
- (B)  $G_1 G_2$
- (C)  $G_1 - G_2$
- (D)  $G_1 / G_2$

58. In a signal flow graph, if any two loops do not have a common node between them, they are called  
(A) Two touching loops  
(B) Two non-touching loops  
(C) Self loops  
(D) Common loops

59. In following process, the molten metal is pouring into the mould under high pressure  
(A) Permanent mould casting  
(B) Slush casting  
(C) Die casting  
(D) Centrifugal casting

60. Draft on pattern for casting is  
(A) Shrinkage allowance  
(B) Identification number marked on it  
(C) Taper to facilitate its removal from mould  
(D) For machining allowance

61. Which of the following welding process uses non-consumable electrode?  
(A) Laser Welding  
(B) MIG Welding  
(C) Butt Welding  
(D) TIG Welding

62. Cores placed in a moulding during casting are used to  
(A) Make desired recess in castings  
(B) Strengthen moulding sand  
(C) Support loose pieces  
(D) Remove pattern easily

63. The factor responsible for the formation of continuous chips with built up edge is  
(A) Low cutting speed and large rake angle  
(B) Low cutting speed and small rake angle  
(C) High cutting speed and large rake angle  
(D) High cutting speed and small rake angle

64. For a particular cutting speed, the tool materials in ascending order of tool life are  
(A) H.S.S., Cemented carbides, ceramics and oxides  
(B) Ceramics and oxides, cemented carbides, H.S.S.  
(C) H.S.S., ceramics and oxides, cemented carbides  
(D) Cemented carbides, ceramics and oxides, H.S.S.

65. In which of the following operation on lathe, the spindle speed will be minimum  
(A) fine finishing  
(B) taper turning  
(C) thread cutting  
(D) knurling

66. In down milling, the thickness of chip is  
(A) Minimum at the beginning of the cut and maximum at the end of the cut  
(B) Maximum at the beginning of the cut and minimum at the end of the cut  
(C) Uniform throughout the cut  
(D) None of these

67. The important mechanical property of material for extrusion purpose is  
(A) Ductility  
(B) Elasticity  
(C) Plasticity  
(D) Brittleness

68. Blanking and piercing operation can be performed simultaneously in  
(A) Simple die  
(B) Progressive die  
(C) Compound die  
(D) Combination die

69. When the fuel is burned and the water appears in the vapour phase, then the heating value of the fuel is known as  
(A) Enthalpy of formation  
(B) Lower heating value  
(C) Enthalpy of reaction  
(D) Higher heating value

70. The efficiency of air standard otto cycle depends on  
(A) Pressure ratio in the cycle  
(B) Temperature ratio in the cycle  
(C) Compression ratio in the cycle  
(D) Mean effective pressure

71. Which process is included in the air standard diesel cycle  
(A) Polytropic compression  
(B) Isochoric heat addition  
(C) Isobaric heat addition  
(D) Isochoric and Isobaric heat addition

72. By the use of lubrication, which efficiency of an IC Engine improves  
(A) Volumetric efficiency  
(B) Indicated thermal efficiency  
(C) Charging efficiency  
(D) Mechanical efficiency

73. The viscosity of a liquid decreases with the increase of  
(A) Pressure (B) Temperature  
(C) Volume (D) Density

74. According to hydrostatic law the variation of pressure is a function of  
(A) Specific weight  
(B) Temperature  
(C) Pressure  
(D) Volume of fluid

75. The pressure intensity at a point in a fluid is  $3.924 \times 10^4 \text{ N/mm}^2$ . The corresponding height of water is  
(A) 2.1 m  
(B) 3 m  
(C) 4 m  
(D) 8 m

76. For a vertical surface submerged in a liquid the distance of centre of pressure from free surface is independent of

- (A) Density of liquid
- (B) Temperature of liquid
- (C) Centre of gravity of liquid
- (D) Centre of pressure of liquid

77. A stoker is a power operated fuel \_\_\_\_\_ mechanism.

- (A) Burning
- (B) Feeding
- (C) Handling
- (D) Storage

78. Which is the correct order for flow of flue gases in the steam power plant?

- (A) Super heater, Economizer, Air pre-heater
- (B) Economizer, Super heater, Air pre-heater
- (C) Air pre-heater, Economizer, Super heater
- (D) Economiser, Air pre-heater, Super heater

79. The coal which has highest ash content is

- (A) Lignite
- (B) Coke
- (C) Bituminous coal
- (D) Peat

80. The diesel plants are mainly used as

- (A) Peak load plants
- (B) Base load plants
- (C) Standby power plants
- (D) Both peak and standby plants

81. Which of the following is not a requirement for site selection of hydroelectric power plant

82. Which element of hydroelectric power plant prevents the penstock from water hammer phenomenon?

- (A) Valves and gates
- (B) Draft tube
- (C) Spillways
- (D) Surge tank

83. Stress concentration in static loading is more serious in

- (A) Ductile materials
- (B) Brittle materials
- (C) Equally serious in both cases
- (D) Depends on other factors

84. The longitudinal joint in a boiler shell is usually a

- (A) Butt joint
- (B) Butt joint with two cover plates
- (C) Lap joint
- (D) Lap joint with single cover plate

85. In the assembly of pulley, key and shaft

- (A) Pulley is made the weakest
- (B) Key is made the weakest
- (C) Key is made the strongest
- (D) All the three are designed for equal strength

86. A transmission shaft subjected to bending loads must be designed on the basis of

- (A) Maximum normal stress theory
- (B) Minimum shear stress theory
- (C) Distortion energy theory
- (D) Strain energy theory

87. Lewi's equation in gears is used to find the

- (A) Tensile stress
- (B) Compressive stress in bending
- (C) Contact stress
- (D) Fatigue stress

**A2**

88. The rated life of a bearing varies

- (A) Directly as load
- (B) Inversely as square of load
- (C) Inversely as cube of load
- (D) Inversely as fourth power of load

89. For large reduction of speed which of the following gear is used?

- (A) Worm gears
- (B) Hypoid gears
- (C) Spiral gears
- (D) Helical gears

90. Backlash in spur gear is the

- (A) Difference between the dedendum of one gear and the addendum of the mating gear
- (B) Difference between the tooth space of the gear and the tooth thickness of the mating gear
- (C) Intensional extension of centre distance between two gears
- (D) Does not exist

91. In the graphical method of linear programming problem, every corner of the feasible polygon indicates

- (A) A basic feasible solution
- (B) Optimum solution
- (C) Both (A) & (B)
- (D) None of the above

92. A basic feasible solution in simplex method is one, when

- (A) All the decision variables are in the base
- (B) All the decision variables and surplus variables are assigned zero values
- (C) All the base variables are non-negative
- (D) All the base variables satisfy the constraint equations

93. M|M|1 (Single Service Model) is

- (A) A single channel and single service unit
- (B) As 'First come First Served' basis

94. In a single channel queue, the mean waiting time in the system is 50 mins, the mean waiting time in the queue is 30 mins, the mean rate of service will be

- 3 / hour
- 2 / hour
- 1 / hour
- 4 / hour

95. If  $D_1$  and  $D_2$  be the diameters of driver and drivers pulleys, then the belt speed is proportional to

- $\frac{D_1}{D_2}$
- $\frac{D_2}{D_1}$
- $D_1 - D_2$
- $D_1$

96. What is not the effect of unbalanced forces?

- Load on bearings
- Dangerous vibrations
- Stresses in various members
- Violation of conservation of mass principle

97. What is the total number of cylinders in a locomotive having crank at right angles?

- One
- Two
- Three
- Four

98. In a Hartnell Governor, the compression of the spring is related to the lift of the sleeve in the following way

- Equal to
- Less than
- Greater than
- None of the above

A2

99. The mass used to balance the mass defect is known as

- (A) Balancing mass
- (B) Defect mass
- (C) Replacement mass
- (D) Fixed mass

100. The height of a simple Watt Governor is proportional to

- (A) Speed (N)
- (B)  $\frac{1}{\text{Speed}}$
- (C)  $(\text{Speed})^2$
- (D)  $\frac{1}{(\text{Speed})^2}$



**KPCL - ASSISTANT ENGINEER MECHANICAL (2024AME)**

<b>A1</b>	<b>ANS</b>	<b>A2</b>	<b>ANS</b>	<b>A3</b>	<b>ANS</b>	<b>A4</b>	<b>ANS</b>
1	B	1	A	1	A	1	B
2	C	2	A	2	B	2	A
3	A	3	C	3	A	3	A
4	D	4	B	4	A	4	B
5	C	5	D	5	D	5	B
6	C	6	B	6	C	6	C
7	C	7	A	7	D	7	B
8	A	8	B	8	B	8	B
9	C	9	D	9	B	9	C
10	D	10	A	10	B	10	C
11	B	11	D	11	A	11	D
12	C	12	A	12	B	12	A
13	A	13	B	13	C	13	B
14	C	14	D	14	A	14	A
15	A	15	B	15	B	15	C
16	D	16	D	16	A	16	D
17	D	17	D	17	C	17	C
18	B	18	B	18	D	18	B
19	A	19	A	19	A	19	B
20	B	20	B	20	D	20	C
21	D	21	A	21	D	21	C
22	A	22	C	22	B	22	D
23	D	23	D	23	A	23	B
24	C	24	A	24	A	24	A
25	D	25	B	25	A	25	C
26	B	26	B	26	A	26	A
27	A	27	C	27	A	27	B
28	A	28	A	28	C	28	A
29	B	29	D	29	B	29	A
30	B	30	C	30	D	30	D
31	C	31	C	31	B	31	C
32	B	32	C	32	A	32	D
33	B	33	A	33	B	33	B
34	C	34	C	34	D	34	B
35	C	35	D	35	A	35	B
36	D	36	B	36	D	36	A
37	A	37	C	37	A	37	B
38	B	38	A	38	B	38	C
39	A	39	C	39	D	39	A
40	C	40	A	40	B	40	B
41	D	41	D	41	D	41	A
42	C	42	D	42	D	42	C
43	B	43	B	43	B	43	D
44	B	44	A	44	A	44	A
45	C	45	B	45	B	45	D
46	C	46	D	46	A	46	D
47	D	47	A	47	C	47	B
48	B	48	D	48	D	48	A
49	A	49	C	49	A	49	A
50	C	50	D	50	B	50	A



**KPCL - ASSISTANT ENGINEER MECHANICAL (2024AME)**

<b>A1</b>	<b>ANS</b>	<b>A2</b>	<b>ANS</b>	<b>A3</b>	<b>ANS</b>	<b>A4</b>	<b>ANS</b>
51	A	51	B	51	B	51	A
52	B	52	A	52	C	52	A
53	A	53	A	53	A	53	C
54	A	54	B	54	D	54	B
55	D	55	B	55	C	55	D
56	C	56	C	56	C	56	B
57	D	57	B	57	C	57	A
58	B	58	B	58	A	58	B
59	B	59	C	59	C	59	D
60	B	60	C	60	D	60	A
61	A	61	D	61	B	61	D
62	B	62	A	62	C	62	A
63	C	63	B	63	A	63	B
64	A	64	A	64	C	64	D
65	B	65	C	65	A	65	B
66	A	66	D	66	D	66	D
67	C	67	C	67	D	67	D
68	D	68	B	68	B	68	B
69	A	69	B	69	A	69	A
70	D	70	C	70	B	70	B
71	D	71	C	71	D	71	A
72	B	72	D	72	A	72	C
73	A	73	B	73	D	73	D
74	A	74	A	74	C	74	A
75	A	75	C	75	D	75	B
76	A	76	A	76	B	76	B
77	A	77	B	77	A	77	C
78	C	78	A	78	A	78	A
79	B	79	A	79	B	79	D
80	D	80	D	80	B	80	C
81	B	81	C	81	C	81	C
82	A	82	D	82	B	82	C
83	B	83	B	83	B	83	A
84	D	84	B	84	C	84	C
85	A	85	B	85	C	85	D
86	D	86	A	86	D	86	B
87	A	87	B	87	A	87	C
88	B	88	C	88	B	88	A
89	D	89	A	89	A	89	C
90	B	90	B	90	C	90	A
91	D	91	A	91	D	91	D
92	D	92	C	92	C	92	D
93	B	93	D	93	B	93	B
94	A	94	A	94	B	94	A
95	B	95	D	95	C	95	B
96	A	96	D	96	C	96	D
97	C	97	B	97	D	97	A
98	D	98	A	98	B	98	D
99	A	99	A	99	A	99	C
100	B	100	A	100	C	100	D

