1. The resistance of a wire is 5Ω at 50°C and 6Ω at 100° C. The resistance of the wire at 0° C will be:

(a) 2 Ω
(b) 1 Ω
(c) 4 Ω
(d) 3 Ω

2. The greatest length of a copper wire that can hang without breaking would be [Breaking stress = 7.2×10^7 N/m^2; Density of copper = 7.2 g/cc; g = 10 m/s^2]:

(a) 10 m
(b) 100 m
(c) 1000 m
(d) 10,000 m

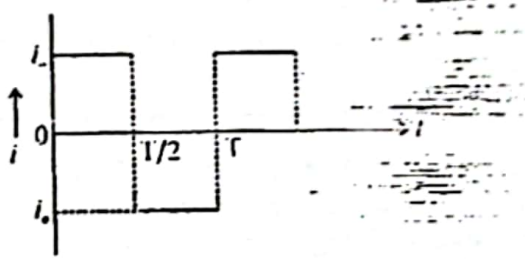
3. A ship of mass 3×10^7kg which is initially at rest can be pulled through a distance of 3 m by means of a force of 5×10^4 N. If there is no water resistance, then the speed attained by the ship will be:

(a) 0.1 m/s
(b) 1 m/s
(c) 10 m/s
(d) 0.01 m/s

4. Two masses, one 'n' times heavier than the other, have equal kinetic energy. The ratio of their momenta (p_2/p_1) would be:

(a) $\sqrt{n}$
(b) n
(c) $n^{3}/_{2}$
(d) n^2

5. Find the value of i_{rms} for the variation of current as given below:



(a) $i_{rms} = i_o / 4$
(b) $i_{rms} = i_o / 2$
(c) $i_{rms} = 4i_o / 3$
(d) $i_{rms} = i_o$

6. An inductance coil of 0.50 H and resistance 100 Ω is connected to a 220V, 50 Hz a.c. supply. What is the time lag between the voltage maximum and current maximum?

(a) 3.2 ms
(b) 3.0 ms
(c) 1.57 ms
(d) 2.57 ms

7. A nucleus with z =92 emits the following in a sequence:

$$\alpha, \alpha, \beta^-, \beta^-, \alpha, \alpha, \alpha, \alpha, \beta^-, \beta^-, \alpha, \beta^+, \beta^+, \alpha.$$

The z of the resulting nucleus is:

(a) 76
(b) 78
(c) 82
(d) 74

8. A potentiometer wire has a length of 5m and resistance of 2 Ω/m. A cell of e.m.f. 5V and a resistance box are connected in series with it. The value of resistance to be introduced in the box so as to get a potential gradient of 0.1 V/m will be

(a) 55 Ω
(b) 90 Ω
(c) 115 Ω
(d) 172 Ω

P.T.O.

9. Bomb calorimeter is used to estimate:
   (a) calorific value of solid and liquid fuels.
   (b) calorific value of gaseous fuels.
   (c) composition of solid and liquid fuels.
   (d) composition of gaseous fuels.

10. The luster of a metal is due to:
   (a) presence of free electrons
   (b) its chemical inertness
   (c) its hydraulic washing
   (d) its high density

11. What chemicals can be used to make a buffer of pH = 10?
   (a) $CH_3COOH + CH_3COONa$
   (b) $NH_4OH + NH_4Cl$
   (c) $H_3PO_4 + CH_3COONa$
   (d) $CH_3COOH + NH_4Cl$

12. Which of the following is not a greenhouse gas?
   (a) CO_2
   (b) CO
   (c) CH_4
   (d) Water

13. Which of the following is not a disinfectant?
   (a) $CaOCl_2$
   (b) $ClNH_2$
   (c) O_3
   (d) Na_2CO_3

14. Which of the following metal forms a volatile oxide film?
   (a) Al
   (b) Pb
   (c) Au
   (d) Mo

15. Nylon-6 is prepared by the self-polymerization of:
   (a) Caprolactam
   (b) ω-Amino undecanoic acid
   (c) Hexa-methylene diamine
   (d) Adipic acid

16. Which of the foilowing functional groups is of an aldehyde?
   (a) $-OH$
   (b) $-\overset{H}{\overset{|}{C}}=O$
   (c) $-\overset{O}{\overset{\|}{C}}-$
   (d) $-\overset{O}{\overset{\|}{C}}-OH$

17. Electrolysis of water produces
   (a) OH^- and O^{2-}
   (b) H_2 and H_3O^+
   (c) H_3O^+ and OH^-
   (d) H_2 and O_2

18. The value of $4\cos12^\circ\cos48^\circ\cos72^\circ$ is:
   (a) $\cos 36^\circ$
   (b) $\cos72^\circ$
   (c) $\sin36^\circ$
   (d) $\sin72^\circ$

19. The value of k for which the points (k, 2–2k), (–k+1, 2k) and (–4 –k, 6 – 2k) are collinear is:
   (a) any value of k
   (b) $k = -1$ or $k = ½$
   (c) $k = 1$ or $k = -½$
   (d) $k = 1$ or $k = ½$

20. If $\cos 40^\circ - \sin 40^\circ = x$, $(x < 2)$, then value of $\cos 80^\circ$ is

(a) $x\sqrt{2 - x^2}$ (b) $2x$

(c) $-x\sqrt{2 - x^2}$ (d) $x + \sqrt{2 - x^2}$

21. The maximum value of $\frac{\log_e x}{x}$ for $x > 0$ is

(a) e (b) $\frac{1}{e}$

(c) e^2 (d) $\frac{1}{e^2}$

22. Value of $\int_{-3}^{3} \frac{x^2 \sin x}{1 + x^6} dx$ is

(a) 0 (b) 1

(c) 2 (d) 4

23. Let $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$, then the value of λ for which the vector $\vec{c} = \lambda\hat{i} + \hat{j} + (2\lambda - 1)\hat{k}$ is parallel to the plane containing $\vec{a}$ and $\vec{b}$ is:

(a) 1 (b) 0

(c) -1 (d) 2

24. The equation of tangent to the circle $x^2 + y^2 + 4x - 4y + 4 = 0$ which makes equal intercepts on positive quadrant is given by:

(a) $x + y = 1$ (b) $x + y = \sqrt{2}$

(c) $x + y = \frac{1}{\sqrt{2}}$ (d) $x + y = 2\sqrt{2}$

25. If the percentage error in the edge of a cube is 1, then the error in its volume is:

(a) 1% (b) 2%

(c) 3% (d) 4%

26. The transmission angle is maximum when the crank angle with the fixed link is:

(a) 0° (b) 90°

(c) 45° (d) 180°

27. In free vibrations, the velocity vector leads the displacement vector by:

(a) π (b) $\pi/2$

(c) $\pi/3$ (d) $2\pi/3$

28. A slider is moving at 150 mm/s on a link rotating at 60 rpm, the coriolis component of acceleration of the slider will be:

(a) $600\ \pi$ mm/s^2 (b) $600\ \pi^2$ mm/s^2

(c) $300\ \pi$ mm/s^2 (d) $300\ \pi^2$ mm/s^2

29. The total number of instantaneous centres of a mechanism having 8 links is:

(a) 14 (b) 28

(c) 8 (d) 16

P.T.O.

30. A cup is provided in screw jack:

(a) to reduce the friction.
(b) to increase load capacity.
(c) to increase efficiency.
(d) to prevent rotation of load.

31. Friction at the sleeve of a centrifugal governor makes it:

(a) more sensitive.
(b) more stable.
(c) Unstable.
(d) insensitive over a small range of speed.

32. The condition of isochronism can be realized in a:

(a) Watt governor
(b) Porter governor
(c) Proell governor
(d) Hartnell governor

33. The size of the cam depends on:

(a) Pitch circle.
(b) Prime circle.
(c) Base circle.
(d) Pitch curve.

34. A pulley and belt in a belt drive constitutes a:

(a) turning pair
(b) sliding pair
(c) cylindrical pair
(d) rolling pair

35. For an involute gear system, the sliding velocity is zero at:

(a) the point of engagement.
(b) the point of disengagement.
(c) the pitch point.
(d) depends upon gear ratio.

36. Annular wheel of an epicyclic gear train has 80 teeth. If the planet wheel has 16 teeth, the sur have the following number of teeth:

(a) 72
(b) 64
(c) 24
(d) 48

37. The critical damping coefficient of a system with a mass of 1 kg attached to the end of a s with a stiffness 0.9 N/mm is:

(a) 120 N/m/s
(b) 30 N/m/s
(c) 600 N/m/s
(d) 60 N/m/s

38. The primary unbalance force is maximum when the angle of the crank with the line of stroke i

(a) 45°
(b) 90°
(c) 135°
(d) 180°

39. A rod of length '*l*' and diameter 'd' is subjected to a tensile force 'P'. Which of the follow sufficient to calculate the resulting change in diameter?

(a) Young's modulus
(b) Shear modulus
(c) Poisson's ratio
(d) Both Young's modulus and Poisson's ra

40. In an application, the bearing is subjected to radial as well as axial loads. The type of r contact bearing used in this application is:

(a) Cylindrical roller bearing
(b) Middle roller bearing
(c) Thrust ball bearing
(d) Taper- roller bearing

41. The deflection of a spring with 20 active coils under a load of 1000 N is 10 mm. The spring is made into two pieces each of 10 active coils and placed in parallel under the same load. The deflection of the system in mm is:

(a) 20 (b) 10
(c) 5 (d) 2.5

42. As the size of the component increases the endurance limit of the component:

(a) increases. (b) remains same.
(c) decreases. (d) increases upto the diameter of 50 mm and then decreases.

43. The included angle between the sides of V-belt is:

(a) 38° (b) 40°
(c) 42° (d) 45°

44. A ball bearing operating at a load of F has 8000 hours of life. The life of bearing, in hours, when the load is doubled to 2F is:

(a) 1000 (b) 2000
(c) 4000 (d) 8000

45. A static fluid can have:

(a) non-zero normal and shear stress. (b) negative normal stress and zero shear stress.
(c) positive normal stress and zero shear stress. (d) zero normal stress and non-zero shear stress.

46. The property of fluid by virtue of which it offers resistance to shear is called:

(a) surface tension (b) adhesion
(c) cohesion (d) viscosity

47. The approach referring to the behaviour of individual fluid particles during their course of motion through space is:

(a) Polar coordinate approach. (b) Lagrangian approach.
(c) Eulerian approach. (d) Laminar – Turbulent method.

48. The piezometric head in a stationary fluid:

(a) remains constant only on a horizontal plane. (b) remains constant at all points in the fluid.
(c) increases linearly with depth below a free surface. (d) decreases linearly with depth below a free surface.

49. For pipes, laminar flow occurs when Reynolds number is:

(a) less than 2000 (b) between 2000 and 4000
(c) more than 4000 (d) less than 4000

50. According to Bernoulli's equation for steady ideal fluid flow:

(a) the velocity and pressure are inversely proportional. (b) the total energy is constant throughout.
(c) the total energy is constant along a streamline but may vary across streamlines. (d) none of the above.

P.T.O.

51. The Reynold's number for flow of a fluid in a circular tube is specified at 2500. The Reyn number when the tube diameter is increased by 20% and the fluid velocity is decreased by keeping fluid the same, is:

(a) 200
(b) 1200
(c) 1800
(d) 3600

52. If cross-sectional area is denoted by A and wetted perimeter of pipe is denoted by P then Hydra mean depth is:

(a) $A \cdot P$
(b) $\sqrt{A \cdot P}$
(c) $\frac{A}{P}$
(d) $\frac{P}{A}$

53. It is required to convey the same discharge by replacing a pipe of diameter 'D' by two e parallel pipes of diameter 'd'. Then, $\frac{d}{D}$ should be :

(a) 0.37
(b) 0.42
(c) 0.50
(d) 0.76

54. In series-pipe applications:

(a) the head losses through each pipe are added to obtain the total head loss.
(b) friction factors are same for each pipe.
(c) the head loss is same through each pipe.
(d) none of the above.

55. Head loss in turbulent flow in a pipe:

(a) varies directly as velocity.
(b) varies inversely as square of velocity.
(c) varies approximately as square of velocity.
(d) depends upon orientation of pipe.

56. Atmospheric pressure head equals:

(a) 2.5 m of water
(b) 0 m of water
(c) 8 m of water
(d) 10.3 m of water

57. Reynolds number represents the ratio of inertia forces to:

(a) viscous forces.
(b) elastic forces.
(c) gravity force.
(d) surface tension force.

58. The total pressure force on a plane area is equal to the area multiplied by the intensity of pressur the centroid, if:

(a) the area is horizontal.
(b) the area is vertical.
(c) the area is inclined.
(d) none of the above.

59. A turbo machine becomes more susceptible to cavitation if:

(a) pressure falls below the vapour pressure.
(b) velocity attains a high value.
(c) pressure becomes very high.
(d) temperature rises above the critical value.

60. In reaction turbine the function of a draft tube is to:

(a) increase the rate of flow.
(b) provide safety to turbine.
(c) reconvert the kinetic energy to flow energy.
(d) prevent water leakage.

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61. If 'm' is the jet ratio, the number of buckets in a Peloton turbine are given by:

(a) 0.5 m
(b) 10+ 0.5 m
(c) 15 + 0.5 m
(d) 20 + 0.5 m

62. In a double acting reciprocating pump of cross sectional area of piston A, stroke length L and crank speed N (rpm), the discharge is:

(a) $\frac{ALN}{60}$
(b) $\frac{ALN}{120}$
(c) $\frac{2ALN}{60}$
(d) $\frac{3ALN}{60}$

63. A hydraulic ram acts like a:

(a) a centrifugal pump.
(b) a rotary pump.
(c) a reciprocating pump.
(d) an impulse pump.

64. Kelvin Planck's law deals with:

(a) conservation of energy.
(b) conservation of heat.
(c) conservation of mass.
(d) conversion of heat into work.

65. A rigid tank contains a hot fluid that is cooled while being stirred by a paddle wheel. Initially, the internal energy of the fluid is 800 kJ. During the cooling process, the fluid loses 500 kJ of heat, and the paddle wheel does 100 kJ of work on the fluid. The final internal energy of the fluid, neglecting the energy stored in the paddle wheel, is:

(a) 410 kJ
(b) 400 kJ
(c) 800 kJ
(d) 1200 kJ

66. In a reversible adiabatic process the ratio $\left(\frac{T_1}{T_2}\right)$ is equal to

(a) $\left(\frac{P_1}{P_2}\right)^{\frac{\gamma-1}{\gamma}}$
(b) $\left(\frac{V_1}{V_2}\right)^{\frac{\gamma-1}{\gamma}}$
(c) $(V_1V_2)^{\frac{\gamma-1}{2\gamma}}$
(d) $\left(\frac{V_2}{V_1}\right)^{\gamma}$

67. An engine receives 15152 J/s of heat and produces 5 kW of power. The efficiency of the engine is:

(a) 25%
(b) 27.5%
(c) 30%
(d) 33 %

68. Which of the following is an irreversible process?

(a) An isothermal process.
(b) An isentropic process.
(c) An isobaric process.
(d) An isenthalpic process.

69. With increase in pressure, the latent heat of steam:

(a) does not change.
(b) increases.
(c) decreases.
(d) remains unpredictable.

70. The radiation heat transfer between two surfaces can be reduced by:

(a) bringing the surfaces closer.
(b) introducing radiation shield between them.
(c) polishing the surfaces.
(d) roughening the surfaces.

P.T.O.

71. Gases have poor:

(a) Transmissivity (b) Absorptivity
(c) Reflectivity (d) Emissivity

72. Air is compressed isothermally by performing work equal to 16 kJ upon it. The change in inter energy is:

(a) –16 kJ (b) zero
(c) 16 kJ (d) 32 kJ

73. The relation $\nabla^2 T = 0$ is referred to as:

(a) Fourier heat conduction equation. (b) Laplace equation.
(c) Poisson equation. (d) Euler equation.

74. If we imagine a curve within a fluid, the tangent at every point of which indicates the direction the velocity of the fluid particle, then the curve is known as a:

(a) Boundary layer (b) Stream line
(c) Streak line (d) Laminar curve

75. Carburetor is mainly employed in:

(a) SI engine (b) CI engine
(c) Gas engine (d) None of the above

76. Iso-octane has:

(a) Straight chain structure with 8 carbon atoms. (b) Ring chain structure with 8 carbon atoms.
(c) Branched chain structure with 8 carbon atoms. (d) None of the above.

77. For SI engines, most preferred fuels are:

(a) Aromatics (b) Paraffins
(c) Olefins (d) Naphthenes

78. Morse test is applicable only to:

(a) single cylinder SI engines. (b) single cylinder CI engines.
(c) multi cylinder CI engines. (d) single and multi cylinder SI and CI engines

79. The mass of the air in a room whose dimensions are 4m × 5m × 6m at 100 kPa and 25°C is:

(a) 140.3 kg (b) 139 kg
(c) 141 kg (d) 138 kg

80. Steam coming out of the whistle of a pressure cooker is:

(a) dry saturated vapour. (b) wet vapour.
(c) super-heated vapour. (d) ideal gas.

81. For the same maximum pressure and the heat input:

(a) $\eta_{Otto} > \eta_{Diesel}$ (b) $\eta_{Diesel} > \eta_{Otto}$
(c) $\eta_{Otto} = \eta_{Diesel}$ (d) Not comparable

82. Job evaluation is the method of determining the
(a) relative value of a job.
(b) workers performance on a job.
(c) worth of the machine.
(d) value of overall production.

83. If 'R' is the base rate guaranteed per hour, 'S' is the standard time for the job and 'T' is the actual time, then according to Rowan plan, wages for the job will be:
(a) TR
(b) $TR + \frac{S-T}{2} \times R$
(c) $TR + (S-T)R$
(d) $TR + \frac{S-T}{S} \times R$

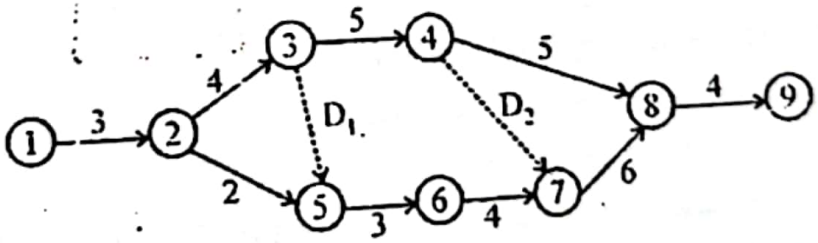
84. ISO 14001 is:
(a) Quality Management System Requirements.
(b) Information Technology Service Management System Requirements.
(c) Environmental Management System Requirements.
(d) Occupational Health and Safety Management System Requirements.

85. Just-in-Time (JIT) is also known as:
(a) Pull System of Manufacturing
(b) Push System of Manufacturing
(c) Kaizen Activity
(d) Both (a) and (b)

86. An example of control chart for fraction defectives is:
(a) p-chart
(b) c-chart
(c) u-chart
(d) X bar-R- chart

87. Which of the following is not a type of inventory?
(a) Raw material
(b) Work-in-Process (WIP)
(c) Finished goods
(d) Production facilities

88. For the network shown in the figure below, the critical path is along:



(a) 1-2-3-4-8-9
(b) 1-2-3-5-6-7-8-9
(c) 1-2-3-4-7-8-9
(d) 1-2-5-6-7-8-9

89. Chips with built-up edge can be expected when machining:
(a) ductile material.
(b) brittle material.
(c) hard material.
(d) tough material.

90. Cast Iron during machining process produces:
(a) continuous chips.
(b) discontinuous chips.
(c) continuous chips with built-up-edge.
(d) none of these.

P.T.O.

91. Which of the following pair(s) match correctly?

I. Hypo-eutectoid steel ---------- less than 0.83% carbon.
II. Melting point of iron in its purest form ---------- 1539° C.
III. The boundary between a liquid phase and a (L+S) phase in a binary phase diagram is call ---------- Solidus.
IV. Iron and steel are also termed as austenitic steel ---------- in α-region.

(a) I and II
(b) I and IV
(c) III and IV
(d) II and III

92. The adhesiveness is the property of sand due to which:

(a) it evolves a great amount of steam and other gases.
(b) the sand grains stick together.
(c) it clings to the sides of a moulding box.
(d) none of these.

93. A casting process used to get a thin-walled metal product is:

(a) Slush Casting
(b) Investment Casting
(c) Slip Casting
(d) Shell Mould Casting

94. Which one of the following welding processes uses a non-consumable electrode?

(a) MIG
(b) TIG
(c) Thermit Welding
(d) Shielded Arc Welding

95. Which one of the following procedural step is not a part of Powder Metallurgy technique?

(a) Compaction
(b) Mixing & Blending
(c) Sintering
(d) Drying & Firing

96. Peen, Eye, Cheeks and Face refers to the parts of:

(a) Hacksaw
(b) Tongs
(c) Hammer
(d) Files

97. Galvanized iron is soft steel coated with molten:

(a) Copper
(b) Brass
(c) Zinc
(d) Tin

98. The hardness of a grinding wheel is determined by the:

(a) hardness of abrasive grains.
(b) ability of the bond to retain abrasives.
(c) hardness of the bond.
(d) ability of the grinding wheel to penetrate work piece.

99. In order to have interference fit, it is essential that the lower limit of the shaft should be:

(a) Greater than the upper limit of the hole.
(b) Lesser than the upper limit of the hole.
(c) Greater than the lower limit of the hole.
(d) Lesser than the lower limit of the hole.

100. The flux commonly used in brazing is:

(a) Zinc chloride
(b) Ammonium Chloride
(c) Resin plus alcohol
(d) Borax

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ALIGARH MUSLIM UNIVERSITY, ALIGARH

Answer Key B.E.(MECHANICAL) Admission Test 2019-20

SERIES: A

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

Q.No.	Answer
41	C
42	C
43	B
44	A
45	C
46	D
47	B
48	B
49	A
50	C
51	C
52	C
53	D
54	A
55	C
56	D
57	A
58	D
59	A
60	C
61	C
62	C
63	D
64	D
65	B
66	A
67	D
68	D
69	C
70	B
71	C
72	B
73	B
74	B
75	A
76	C
77	A
78	C
79	A
80	C

Q.No.	Answer
81	B
82	A
83	D
84	C
85	A
86	A
87	D
88	B
89	A
90	B
91	A
92	C
93	A
94	B
95	D
96	C
97	C
98	B
99	A
100	D

COORDINATOR
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