

**COMBINED TECHNICAL SERVICES EXAMINATION
(NON-INTERVIEW POST)**

COMPUTER BASED TEST

DATE OF EXAM: 05.08.2025 FN

**PAPER-II-INDUSTRIAL SAFETY AND HEALTH
(UG DEGREE STANDARD) (CODE: 515)**

1. The Reynolds number for momentum, heat and mass transfer is best applicable for
- (A) ☒ gases in turbulent flow
 - (B) gases in laminar flow
 - (C) liquids in turbulent flow
 - (D) liquids and gases in laminar flow
 - (E) Answer not known
2. In equimolar counter diffusion, concentration variation along diffusion path is
- (A) logarithmic
 - (B) exponential
 - (C) ☒ linear
 - (D) invariant
 - (E) Answer not known
3. A material contains 20% water on wet basis. What is the moisture content of the material on dry basis?
- (A) 33.3%
 - (B) ☒ 25%
 - (C) 16.67%
 - (D) 80%
 - (E) Answer not known
4. A binary distillation column is operating with a mixed feed containing 20% (mol) vapour. If the feed quality is changed to 80% (mol) vapour, the change in slope of the q-line is
- (A) -4
 - (B) $-\frac{1}{4}$
 - (C) 4.75
 - (D) ☒ 3.75
 - (E) Answer not known

5. The predominant mode of heat transfer in electrical transmission lines is
- (A) Conduction (B) ☒ Natural convection
(C) Forced convection (D) Radation
(E) Answer not known
6. Baffles are provided in heat exchanger to
- (A) Reduce heat transfer rate
(B) ☒ Increase heat transfer rate
(C) Remove dirt
(D) Reduce vibration
(E) Answer not known
7. When the heated surface is submerged below the free surface of a liquid, the process is called :
- (A) ☒ Pool boiling (B) Bulk boiling
(C) Sub cooled (D) Local boiling
(E) Answer not known
8. The overshoot decreases as the value of damping parameter
- (A) Decreases (B) ☒ Increases
(C) Minimum (D) Moderate
(E) Answer not known

9. The characteristic equations of the process control system is $S^3 + 30S^2 + (K + 200)S + 40K = 0$. Find the value of gain for which system just causes installed?

(A) $K_c = 500$

(B) $K_c = 600$

(C) $K_c = 100$

(D) $K_c = 200$

(E) Answer not known

10. The transfer function of a transportation lag (τ_d) is given by

(A) $-S\tau_d$

(B) $e^{-S\tau_d}$

(C) $S\tau_d$

(D) $e^{S\tau_d}$

(E) Answer not known

11. Find the value of time constant (π) for the first order process control system whose transfer function is given by

$$G(S) = \frac{4}{48S + 4}$$

(A) 48

(B) 24

(C) 12

(D) 4

(E) Answer not known

12. Match Column I with Column II :

Column I	Column II
P. $t^n e^{-at}$	(i) $\frac{1}{S}$
Q. $\cos kt$	(ii) $\frac{K}{(s+a)^2 + k^2}$
R. 1	(iii) $\frac{n!}{(S+a)^{n+1}}$
S. $e^{-at} \sin kt$	(iv) $\frac{S}{s^2 + k^2}$

- (A) P-(ii), Q-(iii), R-(i), S-(iv)
 (B) P-(iii), Q-(iv), R-(i), S-(ii)
 (C) P-(iv), Q-(iii), R-(i), S-(ii)
 (D) P-(i), Q-(ii), R-(iii), S-(iv)
 (E) Answer not known

13. The implicit method to solve partial differential equation by finding the solution of set of simultaneous equation is

- (A) Schmidt method (B) Bender Schimdt method
 (C) Jacobi method (D) Crank Nicholson method
 (E) Answer not known

14. The solution for the differential equation with conditions prescribed at one point (x_0) then it constitutes

- (A) Boundary value problem (B) Initial value problem
 (C) Finite difference method (D) Survey method
 (E) Answer not known

15. The convergence of root is very much faster in which of the given method in solving polynomial equation $f(x) = 0$
- (A) Bisection method (B) Iteration method
(C) Method of false position (D) ☒ Secant method
(E) Answer not known
16. Secant method to find the roots of non linear polynomial equation is also known as
- (A) ☒ Chord method (B) Method of tangents
(C) Newton Raphson method (D) Muller method
(E) Answer not known
17. The characteristic length L for a spherical pore of radius R is
- (A) $\frac{4R}{3}$ (B) $R/2$
(C) $R/4$ (D) ☒ $R/3$
(E) Answer not known
18. The regime of strong pore resistance is observed in first order reaction taking place in cylindrical pore when the value of thick modulus is
- (A) 1 (B) less than 0.4
(C) 2 (D) ☒ greater than 4
(E) Answer not known

19. The reactor performance is only slightly affected by the type of flow when the conversion is
- (A) medium (B) high
 (C) ☒ small (D) very high
 (E) Answer not known
20. The reaction sequence for side by side parallel reaction is
- (A) $A \rightarrow R \rightarrow S$ (B) $A \rightarrow R$
 $A \rightarrow S$
 (C) ☒ $A \rightarrow R$ (D) $A \rightarrow R + S$
 $\searrow S$
 (E) Answer not known
21. For a single-phase separately excited dc motor drive, which of the following is/are correct statements with regard to average speed
- (i) directly proportional to back emf of motor
 (ii) inversely proportional to average current of motor
 (iii) inversely proportional to the flux in the motor
 (iv) directly proportional to voltage across thyristors
- (A) (i) only (B) (ii) and (iv) only
 (C) ☒ (i) and (iii) only (D) (i), (ii) and (iv) only
 (E) Answer not known

22. While operating on variable frequency supplies, the AC motor requires variable voltage in order to
- (A) protect the insulation
 - ☒ (B) minimize the effect of saturation
 - (C) protect the thyristor from dv/dt
 - (D) improve the resistance drop
 - (E) Answer not known
23. In the speed-torque curves of chopper fed dc series motor, as the time ratio increases, the speed
- ☒ (A) increases
 - (B) decreases
 - (C) remains neutral
 - (D) is ineffective
 - (E) Answer not known
24. In a single phase full wave rectifier, the load is resistive with $R = 5\Omega$, if the peak value of the input supply voltage is 200V and $f = 50$ Hz. Find the average value of output voltage,
- (A) 196.08 V
 - (B) 168.09 V
 - (C) 186.01 V
 - ☒ (D) 198.06 V
 - (E) Answer not known
25. Phantom loading is used in energy meter testing primarily to :
- (A) Isolate the current and potential circuits
 - (B) Reduce power loss during testing
 - (C) For meters having low current ratings
 - ☒ (D) Test high current meters when suitable loads are unavailable and to minimize power loss
 - (E) Answer not known

26. The circuit turn off-time for a 3-phase full-converter connected to a three phase supply voltage of 230 V, 50 Hz is
- (A) 24.44 msec (B) 21.23 msec
 (C) 13.33 msec (D) 10.12 msec
 (E) Answer not known
27. In a half-wave or full wave voltage multiplier circuit, the correct option is
- (A) voltage doubler employs two diodes and two capacitors
 (B) voltage tripler employs three diodes and two capacitors
 (C) voltage quadrupler employs four diodes and two capacitors
 (D) voltage doubler employs four diodes and three capacitors
 (E) Answer not known
28. PID controllers are tuned based on the frequency response of the closed-loop system by
- (A) using the open-loop gain corresponding to marginal stability
 (B) using the maximum amplitude of response
 (C) using the maximum value of phase
 (D) using both amplitude and phase of response
 (E) Answer not known
29. The undamped natural frequency of closed loop response with $W_n = 0.4472$ rad/s ; damping factor $\zeta = 0.22$ and steady state error $e_1(\infty) = 0$ will be
- (A) 0.735 rad/s (B) 0.638 rad/s
 (C) 0.546 rad/s (D) 0.435 rad/s
 (E) Answer not known

30. If two gears have number of teeth N_1 and N_2 , radii r_1 and r_2 , angular displacements θ_1 and θ_2 and torques T_1 and T_2 (received on shaft on second gear), find the valid relation.

(A) ☒ $\frac{T_1}{T_2} = \frac{\theta_2}{\theta_1} = \frac{N_1}{N_2} = \frac{r_1}{r_2}$

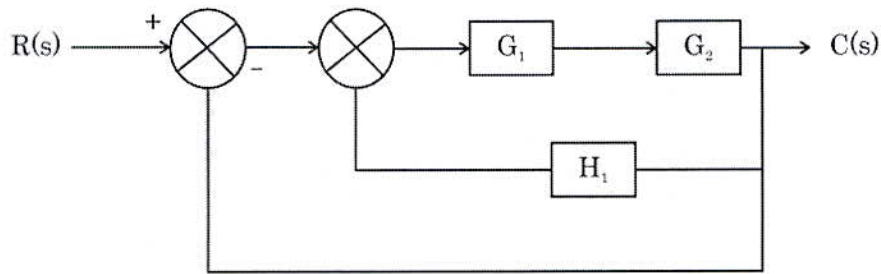
(B) $\frac{T_1}{T_2} = \frac{\theta_2}{\theta_1} = \frac{N_2}{N_1} = \frac{r_1}{r_2}$

(C) $\frac{T_1}{T_2} = \frac{\theta_2}{\theta_1} = \frac{N_1}{N_2} = \frac{r_2}{r_1}$

(D) $\frac{T_1}{T_2} = \frac{\theta_1}{\theta_2} = \frac{N_1}{N_2} = \frac{r_2}{r_1}$

(E) Answer not known

31. The transfer function $C(s)/R(s)$ of the system block shown below is given by



(A) $(G_1 - G_2)/(1 + H_1 G_1)$

(B) $G_1 G_2/(1 + G_1 H_1 + G_2)$

(C) $G_1 G_2(1 + H_1 - G_1 G_2)/G_1 H_1 G_2$

(D) ☒ $G_1 G_2/(1 + G_1 G_2 H_1 + G_1 G_2)$

(E) Answer not known

32. In the given force equation for the system,

$$M \frac{d^2(y-x)}{dt^2} + f \frac{dy}{dt} + ky = 0$$
 if a - constant acceleration is applied to the accelerometer then the steady-state displacement 'y' is a measure of
- (A) ☒ constant input acceleration
 - (B) variable acceleration
 - (C) force due to spring ($-ky$)
 - (D) constant output velocity
 - (E) Answer not known
33. The acquisition time in sample-and-hold characteristics of data acquisition system is time required
- (A) before the sample command, for unholding capacitor to discharge
 - (B) before the hold command, to switch off the capacitor
 - (C) ☒ after the sample command, for hold capacitor to charge
 - (D) after the hold command, to switch on the capacitor
 - (E) Answer not known
34. In Data Acquisition System, if in pre-amplification circuit, signal levels below a tenth of an mV is needed then the following is used :
- (A) Amplifier
 - (B) Attenuator
 - (C) ☒ Differential amplifier
 - (D) Summing amplifier
 - (E) Answer not known

35. What is the bandwidth required for an F.M. signal in which the modulating frequency is 2 kHz and maximum deviation is 10 kHz?
- (A) 16 kHz (B) ~~32 kHz~~
(C) 12 kHz (D) 56 kHz
(E) Answer not known
36. A linear displacement transducer (digital) normally uses
- (A) Straight binary code (B) BCD
(C) ~~Gray code~~ (D) Hexadecimal code
(E) Answer not known
37. Piezoelectric transducer cannot measure _____ pressure.
- (A) Gauge pressure (B) Absolute pressure
(C) Vacuum pressure (D) ~~Static pressure~~
(E) Answer not known
38. In a transducer, the observed output deviates from the correct value by a constant factor the resulting error is called
- (A) Zero error (B) Non-conformity error
(C) Deadzone error (D) ~~Sensitivity error~~
(E) Answer not known

39. In electrodynameometer type wattmeters, current coils designed for carrying heavy currents use stranded wire (or) laminated conductors :
- (i) to reduce iron losses
 - (ii) to reduce hysteresis losses
 - (iii) to reduce eddy current losses
 - (iv) to reduce friction losses
- (A) (i) and (ii) only (B) (ii) only
(C) ☒ (iii) only (D) (iii) and (iv) only
(E) Answer not known
40. Calculate the sensitivity of a $200\mu\text{A}$ meter movement which is to be used as a dc voltmeter.
- (A) ☒ $5\text{k}\Omega/\text{V}$ (B) $200\text{k}\Omega/\text{V}$
(C) $50\text{k}\Omega/\text{V}$ (D) $150\text{k}\Omega/\text{V}$
(E) Answer not known
41. A gear wheel having 60 teeth is mounted on a shaft running of 1800 rpm drives a gear having 30 teeth through two carriers 120 teeth and 60 teeth. The 30 teeth gear drives a double worm which is mounted on a shaft. Find the speed of the last shaft.
- (A) 900 rpm (B) 1800 rpm
(C) ☒ 3600 rpm (D) 7200 rpm
(E) Answer not known

42. Which among the following is liquidity ratios?

1. Current ratio
2. Activity ratio
3. Profitability ratio
4. Quick ratio

- (A) 1 and 2 only (B) 2 and 3 only
(C) 1 and 4 only (D) 1 and 3 only
(E) Answer not known

43. Match the following :

- | | |
|------------------------|-----------------------|
| (a) Fixed cost | 1. Electricity |
| (b) Variable cost | 2. Undertaking member |
| (c) Semi variable cost | 3. Depreciation |
| (d) Controllable cost | 4. Labour |

- | | (a) | (b) | (c) | (d) |
|-----|------------------|-----|-----|-----|
| (A) | 3 | 4 | 1 | 2 |
| (B) | 2 | 4 | 1 | 3 |
| (C) | 4 | 2 | 1 | 3 |
| (D) | 1 | 4 | 3 | 2 |
| (E) | Answer not known | | | |

44. Calculate the ends per inch of the $3/60^s$ stock part system.

- (A) 60 (B) 70
(C) 80 (D) 90
(E) Answer not known

45. In winding machine, the traverse guide makes 50 double traverse/minute, each traverse being 30 cm. What is the velocity of yarn guide in meters per seconds (m/s)
- (A) 0.4 (m/s) (B) 0.416 (m/s)
 (C) ☒ 0.5 (m/s) (D) 0.25 (m/s)
 (E) Answer not known
46. Expand the abbreviation BPRE.
- (A) ☒ Business Process Reengineering
 (B) Better Process Reengineering
 (C) Business Product Reengineering
 (D) Better Product Reengineering
 (E) Answer not known
47. Identify the correct one.
 Function of safety managements are
- (A) Management, Individual
 (B) Organisational, Health
 (C) Administration, Transport
 (D) ☒ Humanitarian, Organisational
 (E) Answer not known
48. For a shuttle loom, if radius of crank and length of connecting rod are 10 and 40 cm respectively, then find the value of sley eccentricity ratio.
- (A) ☒ 0.25 (B) 0.45
 (C) 0.5 (D) 0.55
 (E) Answer not known

49. Patent is a contract between the _____ and _____
- (A) Inventor and Company (B) ☒ Inventor and the Society
(C) Inventor and Government (D) Inventor and Agency
(E) Answer not known
50. Choose the wrong one.
Under employee Rights, Right to privacy policy.
1. The pay bill section can access the information on insurance.
 2. Persons who have applied for the job of cashier are required to report if there are any criminal (or) civil cases pending against then.
 3. A supervisor might suspect a worker and not conduct a search in his cupboard with another officer as witness.
 4. The company may install surveillance camera (or) bugging device to monitor personal conversations.
- (A) 1, 2 are wrong (B) 2 and 3 are wrong
(C) ☒ 3 only wrong (D) 4 only wrong
(E) Answer not known
51. Gilligan's theory the context oriented emphasis on maintaining personal relationship was called as
- (A) Moral rule (B) Mutual caring
(C) ☒ Ethics of care (D) Moral integrity
(E) Answer not known

52. The Factory Act 1948 examine the following
1. Licensing and approval of plant
 2. Disposal of waste
 3. Lighting
 4. Dust and fumes
- (A) ☒ 1, 2, 3, 4 are correct (B) 1, 2, 3 only correct
(C) 1, 2 only correct (D) 1 only correct
(E) Answer not known
53. A sudden fire occurred in a petroleum storage tank containing 1000 litres of petrol. As per Indian standards, above scenario is classified as _____
- (A) Class A fire (B) ☒ Class B fire
(C) Class C fire (D) Class D fire
(E) Answer not known
54. Which of the following is used in HAZOP study to perform analysis?
- (A) Checklists (B) ☒ Guide words
(C) Mathematical models (D) Logic gates
(E) Answer not known

55. Which of the following steps is correct for the management of hazardous and other wastes?

- (A) Minimization → Prevention → Recycling → Reuse → Disposal → Recovery
- (B) Prevention → Minimization → Reuse → Recycling → Recovery → Disposal
- (C) Prevention → Minimization → Recovery → Reuse → Recycling → Disposal
- (D) Prevention → Minimization → Disposal → Recovery → Reuse → Recycling
- (E) Answer not known

56. The porosity of the stratum is quantitative measurement of interstices of the voids present in a given volume is

where V_v – Volume of voids

V – Total volume

- (A) $\eta = V_v/v \times 100$
- (B) $\eta = V_0 V/v \times 100$
- (C) $\eta = V^2 V_v/V \times 100$
- (D) $\eta = V_0 \cdot V_v^2 / V \times 100$
- (E) Answer not known

57. The process of photosynthesis in which the green plants produce _____ in presence of sunlight and consume _____

- (A) Oxygen, CO_2
- (B) N_2 , O_2
- (C) CH_4 , O_2
- (D) CO , CO_2
- (E) Answer not known

58. _____ of cross flow filtration lengthens membrane life enough to make it economically attractive.
- (A) Inter connecting
 - (B) Allowing free flow
 - (C) ☒ Self cleaning nature
 - (D) Maximum
 - (E) Answer not known
59. Smoke is produced by incomplete combustion. It consists of carbon particle of size less than
- (A) 2.0 micron
 - (B) 3.0 micron
 - (C) ☒ 1.0 micron
 - (D) 4.0 micron
 - (E) Answer not known
60. The total BOD of industrial waste water is 800 kg/day and BOD value is 0.08 kg/capita/day. Calculate the population equivalent.
- (A) 20,000
 - (B) 12,000
 - (C) ☒ 10,000
 - (D) 15,000
 - (E) Answer not known
61. Which of the following statements about advantage of wet grinding over dry grinding is incorrect?
- (A) Amount of fines produced by wet grinding is less than dry grinding
 - (B) Removal of product is easier
 - (C) ☒ Dust formation is eliminated
 - (D) ☒ Plant capacity reduced
 - (E) Answer not known

62. In froth, floatation, chemical agent added to cause air adherence is called
- (A) ☒ Collector (B) Frother
(C) Modifier (D) Activator
(E) Answer not known
63. The work required for crushing the material is proportional to the logarithm of the ratio between the initial and final diameters. This is the statement of
- (A) Bond's law
(B) Rittinger's law
(C) ☒ Kick's law
(D) Work Index
(E) Answer not known
64. Bernoulli's equation deals with conservation of
- (A) Mass (B) ☒ Energy
(C) Momentum (D) Force
(E) Answer not known
65. A fluid which has a linear relationship between the magnitude of applied shear-stress and the resulting rate of deformation is called _____ fluid.
- (A) ☒ Newtonian (B) Non Newtonian
(C) Ideal (D) Incompressible
(E) Answer not known

66. The continuity equation of fluid mechanics utilises the principle of conservation of
- (A) Momentum (B) ☒ Mass
 (C) Energy (D) Mass and Energy
 (E) Answer not known
67. The normal force exerted by a fluid per unit area of the surface is called as :
- (A) ☒ Fluid pressure (B) Pressure head
 (C) Velocity head (D) Equilibrium
 (E) Answer not known
68. State the relationship between ' f ' (friction factor) and N_{Re} (Reynolds number) for laminar flow.
- (A) ☒ $f = 16/N_{Re}$ (B) $f = 4/N_{Re}$
 (C) $N_{Re} > 2100$ (D) N_{Re} above 4000
 (E) Answer not known
69. A carnot cycle having an efficiency of 0.75. If the high temperature Reservoir is 727 °C. What is the temperature at low temperature reservoir?
- (A) 23 °C (B) ☒ -23 °C
 (C) 0°C (D) 250°C
 (E) Answer not known

70. The molar density of water vapour at normal boiling point of water is 33 mol/m^3 . The compressibility factor under these conditions close to which one of the following? $R = 8.314 \text{ J/mol K}$
- (A) 0.75 (B) 1
(C) 1.25 (D) 1.5
(E) Answer not known
71. A balloon containing ideal gas is initially kept in an evacuated and insulated room. The balloon ruptures and the gas fills up the entire room. Which is true at the end of the above process?
- (A) The internal energy of the gas decreases and enthalpy is constant
(B) The internal energy of the gas increases and enthalpy is constant
(C) Both internal energy and enthalpy remains constant
(D) Both internal energy and Enthalpy of the gas increase
(E) Answer not known

72. Match the following :

- | | |
|-----------------|-------------------------|
| (a) Nitrogen | 1. Immunity development |
| (b) Phosphorous | 2. Fruit production |
| (c) Potassium | 3. Leaf growth |
| (d) Calcium | 4. Shoot development |
| (e) Magnesium | 5. Photosynthesis |

- | | (a) | (b) | (c) | (d) | (e) |
|---|------------------|-----|-----|-----|-----|
| (A) ☒ | 3 | 2 | 1 | 4 | 5 |
| (B) | 1 | 2 | 3 | 5 | 4 |
| (C) | 5 | 4 | 3 | 2 | 1 |
| (D) | 4 | 5 | 2 | 3 | 1 |
| (E) | Answer not known | | | | |

73. A double effect evaporator system concentrates weak 4% by mass caustic Soda liquor to 25% (by mass) lye, the amount of water evaporated per 100 kg of feed is

- | | |
|----------------------|---|
| (A) 16 kg | (B) ☒ 84 kg |
| (C) 25 kg | (D) 4 kg |
| (E) Answer not known | |

74. The ratio of reacting amount of a component to its initial amount is known as

- | | |
|--|---------------------|
| (A) ☒ Conversion | (B) Selectivity |
| (C) Yield | (D) Excess reactant |
| (E) Answer not known | |

75. The expression $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ is also known as
- (A) Universal gas law
 - (B) Boyle's law
 - (C) ✓ Vander Waals equation
 - (D) Benedict Webb and Rubin equation
 - (E) Answer not known
76. The law that states as total pressure of gas mixture is equal to sum of partial pressure exerted by each component is
- (A) Amagat's law
 - (B) ✓ Dalton's law
 - (C) Raoult's law
 - (D) Boyle's law
 - (E) Answer not known
77. Which equipment produces cement clinkers?
- (A) Dust cyclones
 - (B) ✓ Rotary kiln
 - (C) Crusher
 - (D) Grinder
 - (E) Answer not known
78. The major non-food application for starch is
- (A) Gum and glues
 - (B) ✓ Paper
 - (C) Binder for tablet formation
 - (D) Laundry application
 - (E) Answer not known

79. Match the following :

- | | |
|----------------------|---------------------------------|
| (a) Plastics | 1. Poly hydroxy alkanoate (PHA) |
| (b) Elastomers | 2. Melamine formaldehyde |
| (c) Synthetic fibres | 3. Terylene |
| (d) Epoxy Resin | 4. Silicone Rubber |
| (e) Biopolymer | 5. Polystyrene |

- | | (a) | (b) | (c) | (d) | (e) |
|-----|------------------|-----|-----|-----|-----|
| (A) | 5 | 4 | 3 | 2 | 1 |
| (B) | 4 | 3 | 2 | 1 | 5 |
| (C) | 3 | 5 | 1 | 2 | 4 |
| (D) | 2 | 1 | 4 | 3 | 5 |
| (E) | Answer not known | | | | |

80. Cotton seed oil is rich in

- (A) Linoleic acid, oleic acid and palmitic acid
- (B) Lauric acid, myristic acid and caprylic acid
- (C) Naphthenic acid and palmitic acid
- (D) Arachidic acid, behenic acid and lignoceric acid
- (E) Answer not known

81. The component of electrical power which yields useful mechanical power output is known as

- | | |
|----------------------|------------------|
| (A) Apparent power | (B) Active power |
| (C) Reactive power | (D) Generator |
| (E) Answer not known | |

82. Which of the following is not a part of energy audit as per Energy conservation Act, 2001?
- (A) Monitoring and analysis of energy use
 - (B) Verification of energy use
 - (C) Submission of technical report with recommendations
 - ☒ (D) Ensuring implementation of recommended measures followed by review
 - (E) Answer not known
83. A systematic approach for decision making in the area of energy management which attempts to balance the total energy inputs with its used and quantifies the energy usage on the basis of its discrete functions is called
- (A) Energy banking
 - ☒ (B) Energy auditing
 - (C) Energy rating
 - (D) Energy benchmarking
 - (E) Answer not known
84. A circuit breaker is rated at 1500 amps, 2000 MVA, 33 kV, 3 seconds, 3-phase, oil circuit breaker. Determine the breaking current and making current of the circuit breaker
- (A) 17.49 kA and 44.61 kA
 - ☒ (B) 34.99 kA and 89.22 kA
 - (C) 41.80 kA and 106.59 kA
 - (D) 30 kA and 76.50 kA
 - (E) Answer not known

85. For rural electrification in a country like India with complex network, it is preferable to use
- (A) Air circuit breaker
 - (B) Oil circuit breaker
 - (C) ✓ Vacuum circuit breaker
 - (D) Minimum oil circuit breaker
 - (E) Answer not known
86. A DC 3-wire system with 500 V between outers has lighting loads of 150 kW on the positive side and 100 kW on the negative side. The loss in each balancer machine is 3 kW. The total load on the main generator is
- (A) 250 kW
 - (B) ✓ 256 kW
 - (C) 500 kW
 - (D) 556 kW
 - (E) Answer not known
87. What is the step angle of a Permanent – Magnet stepper motor having 8 stator poles and 4 rotor poles?
- (A) 60°
 - (B) ✓ 45°
 - (C) 30°
 - (D) 15°
 - (E) Answer not known

88. Match List I and List II and select the correct answer using the codes given below the lists :

List I
(Load power factor)

- (a) Zero leading
- (b) Unity
- (c) Zero lagging
- (d) Zero with armature terminals suddenly short circuited

List II

(Nature of armature flux in an alternator)

- 1. Demagnetizing
- 2. Magnetizing
- 3. Cross-magnetizing
- 4. Initially constant, demagnetizing

- | | (a) | (b) | (c) | (d) |
|-------|------------------|-----|-----|-----|
| (A) | 1 | 2 | 4 | 3 |
| (B) ✓ | 2 | 3 | 1 | 4 |
| (C) | 4 | 3 | 1 | 2 |
| (D) | 2 | 1 | 3 | 4 |
| (E) | Answer not known | | | |

89. A 4-pole DC generator rotates at 1500 rpm. How many times in a second will the emf induced in each armature conductor changes its direction?

- | | |
|----------------------|---------|
| (A) 400 | (B) 200 |
| (C) ✓ 100 | (D) 50 |
| (E) Answer not known | |

90. With a DC Generator which of the following regulation is preferred?

- | | |
|----------------------|--------------|
| (A) 100% | (B) Infinite |
| (C) 50% | (D) ✓ 1% |
| (E) Answer not known | |

- 30

93. Match the following.

The formula for finding equivalent inductance for a various mode of configuration.

- | | | |
|-----------------------|----|--|
| (a) Series Aiding | 1. | $L_1 + L_2 + 2M$ |
| (b) Series opposing | 2. | $L_1 + L_2 - 2M$ |
| (c) Parallel Aiding | 3. | $\frac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}$ |
| (d) Parallel opposing | 4. | $\frac{L_1 L_2 - M^2}{L_1 + L_2 + 2M}$ |

- | | (a) | (b) | (c) | (d) |
|-----|------------------|-----|-----|-----|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 3 | 4 | 1 |
| (C) | 3 | 4 | 1 | 2 |
| (D) | 4 | 3 | 2 | 1 |
| (E) | Answer not known | | | |

94. Choose the correct formula :

Mutual inductance of two coupled inductors (L_A and L_B) satisfies if :

1. $M = \sqrt{L_A + L_B}$
2. $M = \frac{L_A + L_B}{2}$
3. $M > \sqrt{L_A L_B}$
4. $M \leq \sqrt{L_A L_B}$

- (A) 1 and 2 are correct
 (C) 1 only
 (E) Answer not known

- (B) 4 only
 (D) 2 and 3 are correct

95. In order to produce a magnetic flux of $100 \mu\text{wb}$ in an air gap of length 0.2 mn and area of cross section is 1 cm^2 , then the mmf. required is
- (A) 500π (B) $500 / \pi$
 (C) $250 / \pi$ (D) 250
 (E) Answer not known
96. Point charges $Q_1 = 1 \text{ nc}$ and $Q_2 = 2 \text{ nc}$ are at a distance apart. Which of the following statements are incorrect?
- (i) The force on Q_1 is repulsive
 (ii) The force on Q_2 is along the line joining them
 (iii) As the distance between them decreases, the force on Q_1 increases linearly
 (iv) The force on Q_2 is same in magnitude as that on Q_1
- (A) (i) and (ii) (B) (iii) only
 (C) (ii) and (iv) only (D) (iv) only
 (E) Answer not known
97. Which of the following statement is true regarding Ampere's circuital law?
- I. The law can be applied inside a conductor or outside it but total current enclosed by the path should be known
 II. The law is applicable for line currents, sheet currents or volume currents.
- (A) Only II (B) Only I
 (C) Both I and II (D) Neither I nor II
 (E) Answer not known

98. A network has 12 branches and 8 independent loops. How many nodes are there in the network?
- (A) 21 (B) 20
(C) 4 (D) 5
(E) Answer not known
99. Choose the right answer among the type.
KCL is based on the fact that
- (i) There is a possibility for node to store energy.
(ii) Charge accumulation is possible at node.
(iii) No accumulation of charge at a node.
- (A) (iii) only (B) (i) only
(C) (i) and (iii) only (D) (i) and (ii) only
(E) Answer not known
100. KCL deals with the conservation of
- (A) Mass (B) Potential energy
(C) Momentum (D) Charge
(E) Answer not known

101. Arrange the following events in the chronological order

1. Total quality management
2. Quality Planning
3. Quality Inspection
4. Quality Management

- (A) 1, 4, 2, 3
(B) ☒ 3, 2, 4, 1
(C) 2, 3, 4, 1
(D) 1, 4, 3, 2
(E) Answer not known

102. The following charts are categorized as

- (i) $\bar{X}$ chart
- (ii) R chart
- (iii) σ chart

- (A) Attribute
(B) Control
(C) ☒ Variable
(D) None of the above
(E) Answer not known

103. The Deming award has been issued to the organization which are following / adopting _____

- (A) ☒ PDCA cycle
(B) OMR cycle
(C) DMAK cycle
(D) DOE cycle
(E) Answer not known

104. Arrange the following events in chronological order

1. Raw material inspection
2. Finished goods inspection
3. Patrolling
4. Inspection at customers yard
5. Inspection at vendor point

- (A) 1, 5, 4, 3, 2
(B) 1, 3, 4, 5, 2
(C) 5, 1, 3, 2, 4
(D) 4, 2, 3, 1, 5
(E) Answer not known

105. Which of the following statement are true about reliability?

- (i) High reliability of components lead to good quality product.
- (ii) Poorly designed components with very good material, surface finish, tolerance may have low reliability.
- (iii) Low reliability are of poor quality.
- (iv) High quality product with high reliability components.

- (A) (i), (iii) and (iv) only (B) (i), (ii) and (iii) only
(C) (i) and (iv) only (D) (ii) and (iii) only
(E) Answer not known

106. Choose the right matches :

- | | | | |
|----|-------------|---|--|
| 1. | Loading | – | Assignment of
work to man power/machine |
| 2. | Forecasting | – | Production output monitoring |
| 3. | Scheduling | – | Determining the requirements and
control of materials |
| 4. | Dispatching | – | Transition from planning to action phase |

(A) ✓ 1 and 4 are correct

(B) 2 and 3 are correct

(C) 1 and 2 are correct

(D) 3 and 4 are correct

(E) Answer not known

107. The demand rate for a particular item is 12000 units/year. The ordering cost is Rs. 100 per order and the holding cost is Rs. 0.80 per item per month (Assume no shortage and replacement is instantaneous). The EOQ is _____

(A) ✓ 500 units

(B) 1000 units

(C) 1500 units

(D) 2000 units

(E) Answer not known

108. Choose the wrong / incorrect method of presenting the unilateral limits :

1. $30^{+0.13}_{+0.00}$

2. $30^{+0.13}_{-0.12}$

3. $30^{+0.13}_{+0.12}$

4. $30^{-0.13}_{-0.12}$

(A) 1

(B) 2

(C) 3

(D) 4

(E) Answer not known

109. In metal casting process, green sand represents

(i) The colour of the sand and not its moist

(ii) The sand cannot be reused after a casting

(iii) The moisture content when molten metal is poured

(iv) A type of mould made from a mixture of sand, clay and water

(A) (iii) and (iv) only

(B) (ii) and (iii) only

(C) (ii), (iii) and (iv) only

(D) (i), (ii) and (iii) only

(E) Answer not known

110. In a sheet metal project work, a pattern can be originated through which of the following methods.

- (i) Parallel line method
- (ii) Radical line method
- (iii) Triangulation method
- (iv) Try square method

- (A) (i) only
- (B) (iv) only
- (C) (i), (ii) and (iii) only
- (D) (ii) and (iii) only
- (E) Answer not known

111. The disadvantage of liquid penetrant testing is that

- 1. Parts with large surface areas can be measured rapidly.
- 2. Can be applied on non porous materials.
- 3. Parts with complex shapes can be inspected.
- 4. Lower investment cost.

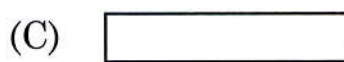
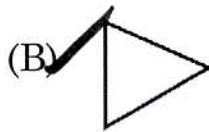
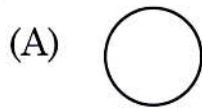
- (A) 2 only
- (B) 3 and 4 only
- (C) 1 and 2 only
- (D) 3 only
- (E) Answer not known

112. Which of the following are true regarding cross-section for fillet weld?

- (1) Convex weld requires more filler material
- (2) There is less stress concentration in convex weld compared with triangular weld

- (A) (1) only
- (B) (2) only
- (C) Both (1) and (2)
- (D) Neither (1) nor (2)
- (E) Answer not known

113. While creating the block diagram of control system in NC machines, the _____ symbol is used as amplifier representation.



(E) Answer not known

114. Elements of machine vision system upholds the following :

1. Material Handling
2. Image acquisition
3. Vision inspection software
4. Probes and sensors

(A)  1, 2 and 3

(B) 2, 3 and 4

(C) 2 and 4

(D) 3 and 4

(E) Answer not known

115. Which of the following statements are correct?

- (i) Creep is the time - dependent permanent deformation that occurs under stress
 - (ii) Ductility refers to the capacity of a material to undergo deformation under compression
 - (iii) Malleability is the capacity of a material to undergo deformation under tension
 - (iv) Permeability is a magnetic property
- (A) ☒ (i) and (iv) (B) (ii) and (iii)
(C) (i) and (ii) (D) (i) and (iii)
(E) Answer not known

116. The degrees of freedom of a system having two components, number of phases as three and having temperature as the only external variable is

- (A) ☒ 1 (B) 2
(C) 0 (D) -1
(E) Answer not known

117. An ion dislodged from the lattice into an interstitial site is called

- (A) Interstitially (B) Schottky imperfections
(C) ☒ Frenkel defect (D) Vacancy
(E) Answer not known

118. For contactless body temperature measurement, advanced thermometers are used. It works on the principle/type/basis of

- (A) ☒ Infrared radiation (B) Ultraviolet radiation
(C) Alpha particles (D) Laser beams
(E) Answer not known

119. Find grain sizes are obtained by

1. Slow cooling
 2. Increasing Nucleation rate
 3. Slow growth rate
 4. Fast cooling
- (A) 1, 2 and 3 (B) ☒ 2, 3 and 4
(C) 1, 3 and 4 (D) 1, 2 and 4
(E) Answer not known

120. Which of the following statements are correct?

Plasticizers are added to the plastics

1. To make them hard
 2. Improve their toughness
 3. To make them elastic
 4. To reduce their viscosity
- (A) 1 and 2 only (B) 1 and 4 only
(C) 3 and 2 only (D) ☒ 3 and 4 only
(E) Answer not known

121. The convective heat transfer coefficient depends on the following factors

- (i) Thermodynamic properties
- (ii) Transport properties
- (iii) Geometry of the surface
- (iv) Nature of fluid flow

(A) (i) and (ii)

(B) (i) and (iii)

(C) (i) and (iv)

(D) (i), (ii), (iii) and (iv)

(E) Answer not known

122. Choose the correct option :

At 100% RH

(i) $DBT > WBT$

(ii) $WBT > DPT$

(iii) $DBT = WBT$

(iv) $DBT = WBT = DPT$

where,

DBT = Dry Bulb Temperature

WBT = Wet Bulb Temperature

DPT = Dew Point Temperature

(A) (i)

(B) (ii)

(C) (iii)

(D) (iv)

(E) Answer not known

123. Electrolux refrigerator is a vapour absorption system that operates with
- (A) one compressor
 - (B) one pump
 - (C) one pump and one compressor
 - ☒ (D) no pump and no compressor
 - (E) Answer not known
124. The effect of superheating suction vapours in vapour compression refrigeration system using R – 12 theoretically results in _____ of refrigeration capacity of the system.
- (A) Reduction
 - ☒ (B) Increase
 - (C) No-charge
 - (D) Cooling
 - (E) Answer not known
125. Which among the following is correct for energy equivalent of 1 tonnage of refrigeration?
- (i) 3000 kcal/h
 - (ii) 210 kJ/min
 - (iii) 305 kW
 - (iv) 12000 BTU
- (A) (i) alone
 - (B) (i) and (ii) alone
 - ☒ (C) (i), (ii), (iii) and (iv)
 - (D) (i), (ii), (iii) and (iv)
 - (E) Answer not known

126. Equivalence ratio is

- (A) (Actual Fuel / air ratio) / (Stoichiometric fuel / air ratio)
- (B) (Stoichiometric fuel / air ratio) / (Actual fuel / air ratio)
- (C) (Stoichiometric fuel / air ratio) / (Actual air / fuel ratio)
- (D) (Actual air / fuel ratio) / (Stoichiometric fuel / air ratio)
- (E) Answer not known

127. A carnot engine does 0.27 kJ of work per cycle, while receiving 0.64 kJ of heat at 260 °C. Determine the temperature of the sink at which heat is rejected.

- (A) 307.5 °C
- (B) 30.75 °C
- (C) 355 °C
- (D) 35.5 °C
- (E) Answer not known

128. A house has a heat requirement of 2 lakh $\frac{kJ}{h}$ in winter for heating.

Heat pump is used to absorb heat from cold air outside in winter and send heat to house. Work required to operate the heat pump is $28000 \frac{kJ}{h}$.

Same amount of heat is to absorbed from this house during summer for cooling the house using similar work input. The lop of heat pump and refrigerator for the above mode of operation is

- (A) 7.14 and 6.14 respectively
- (B) 6.14 and 7.14 respectively
- (C) 5.14 and 4.14 respectively
- (D) 4.14 and 5.14 respectively
- (E) Answer not known

129. Air in vessel having inside volume 10 m^3 at 3 bar is compressed to 3 m^3 without any change in temperature. The pressure of air after compression is

- (A) ☒ 10 bar (B) 0.1 bar
 (C) 100 bar (D) 1 bar
 (E) Answer not known

130. Match the following thermometers with appropriate thermodynamic property

- | | |
|-------------------------------------|----------------------------|
| (a) Alcohol in glass thermometer | 1. Pressure |
| (b) Thermocouple | 2. Monochromatic radiation |
| (c) Constant volume gas thermometer | 3. Length |
| (d) Optical pyrometer | 4. Seebeck effect |

- | | (a) | (b) | (c) | (d) |
|---|------------------|-----|-----|-----|
| (A) ☒ | 3 | 4 | 1 | 2 |
| (B) | 1 | 2 | 3 | 4 |
| (C) | 2 | 3 | 1 | 4 |
| (D) | 4 | 1 | 2 | 3 |
| (E) | Answer not known | | | |

131. Which of the following is the primary factor influencing a battery's capacity?

- (A) Voltage (B) Internal resistance
 (C) ☒ Chemical composition (D) Size of the Battery
 (E) Answer not known

132. The primary by product of a hydrogen fuel cell is
- (A) Carbon di oxide
 - (B) Oxygen
 - (C) Hydrogen
 - (D) ☒ Water
 - (E) Answer not known
133. Which of the following is an advantage of electric vehicle (EVs) over Internal Combustion Engines Vehicles (ICEVs)?
- (A) Higher Maintenance Costs
 - (B) Limited torque at low speeds
 - (C) ☒ Zero tail pipe emissions
 - (D) Higher fuel consumption
 - (E) Answer not known
134. What type of smart grid technology allows customers to manage their electricity consumption?
- (A) Automated Meter Reading (AMR)
 - (B) ☒ Demand Response Program (DRP)
 - (C) Distributed Generation
 - (D) Supervisory Control and Data Acquisition (SCADA)
 - (E) Answer not known
135. Which of the following components is part of an Advanced Metering Infrastructure (AMI) in a smart grid?
- (A) ☒ Smart meters
 - (B) Power transformers
 - (C) Energy storage systems
 - (D) Transmission lines
 - (E) Answer not known

136. In a thermal power plant, feed water from pump enters the boiler through the _____
- (A) Air preheater (B) Chimney
(C) Super heater (D) ☒ Economiser
(E) Answer not known
137. The function of coolant is to
- (A) ☒ Extract heat from reactor
(B) Slow down neutrons
(C) Slow down the alpha particles
(D) Slow down the gama particles
(E) Answer not known
138. Which of the following is the primary energy conversion device in concentrated solar power plants (CSP)?
- (A) Solar panels (B) Heat Exchanger
(C) Stirling engine (D) ☒ Parabolic dish reflector
(E) Answer not known
139. The process of usage of organic material to generate energy is known as
- (A) ☒ Biomass energy (B) Hydro thermal energy
(C) Geothermal energy (D) Nuclear energy
(E) Answer not known

140. In pitch control systems, what is the role of the blade pitch actuator?

- (A) To rotate the nacelle
- ☒ (B) To adjust the blade angle
- (C) To monitor wind speed
- (D) To generate electrical energy
- (E) Answer not known

141. For asymmetrical patterns, in what manner can the fabric be spread?

- (A) Only face to face
- ☒ (B) Only face-up or face-down
- (C) Either face-up or face-down
- (D) Both face-up and face-down simultaneously
- (E) Answer not known

142. What are the categories of protective meshes used in agro-fiber products?

- (i) Weather resistant
 - (ii) Insulation
 - (iii) Protection against solar radiation
- | | |
|--|----------------|
| ☒ (A) (i) and (iii) only | (B) (ii) only |
| (C) (i) only | (D) (iii) only |
| (E) Answer not known | |

143. Arrange the sequence of the following steps for inspecting a pair of trousers.

- (1) Check the crotch
 - (2) Measure the waist
 - (3) Lay the garment face up and visually check the front
 - (4) Turn the trousers inside out
- (A) 3, 2, 1, 4 (B) 1, 3, 2, 4
(C) 2, 3, 1, 4 (D) 4, 2, 1, 3
(E) Answer not known

144. Which of the following is incorrectly paired?

- (1) Steam tunnel – Pressure is not applied
 - (2) Steam air finisher – 'Dolly' press
 - (3) Steam presses – Heated by electric element and controlled by thermostat
 - (4) Irons – Static buck and head of complementary shape
- (A) (3) and (4) (B) (1) and (2)
(C) (2) and (3) (D) (1) and (4)
(E) Answer not known

145. What is the most frequent cause of chemical processing industrial accidents?

- (A) Operator error (B) Power failure
- (C) Mis communication (D) Mechanical failure
- (E) Answer not known

146. The yarn twist factor (K) is defined using the following relationship

(A) ☒ $K = \frac{\text{turns/unit length}}{\sqrt{\text{count}}}$

(B) $K = \frac{\text{turns} \times \sqrt{\text{count}}}{\text{unit length}}$

(C) $K = \frac{\text{turns} - \text{unit length}}{\sqrt{\text{count}}}$

(D) $K = \frac{\text{unit length}}{\text{turns}/\sqrt{\text{count}}}$

(E) Answer not known

147. Identify the right statement from the following related to yarn property on fabric pill formation

(i) Yarns with low twist will pill more than yarns with high twist.

(ii) Hairy yarns pill more than smooth yarns.

(iii) Open end spun yarn pill more than ring spun yarn.

(A) (i) and (ii) only

(B) (i) and (iii) only

(C) (ii) and (iii) only

(D) ☒ (i), (ii) and (iii)

(E) Answer not known

148. The fabric drape co-efficient determine by

where :

F = drape co-efficient

A_D = the area of the specimen

A_d = the area of supporting disk

A_s = the actual projected area of the specimen

(A) ☒ $F = \frac{A_s - A_d}{A_D - A_d}$

(B) $F = \frac{A_D - A_d}{A_s - A_d}$

(C) $F = \frac{A_d - A_s}{A_D - A_d}$

(D) $F = \frac{A_D - A_s}{A_d - A_d}$

(E) Answer not known

149. Identify the correct answer from the following statements is related to stelometer.

- (i) Is used for single fibre strength
- (ii) Is used for testing fibre strength in bundle form
- (iii) Works on constant rate of loading
- (iv) Works on pendulum lever principle
- (A) (i), (ii) and (iii) only
- (B) (ii), (iii) and (iv) only
- (C) (i), (iii) and (iv) only
- (D) (i), (ii) and (iv) only
- (E) Answer not known

150. Identify the correct statement from the following is related to trash content.

- (A) Trash content is not related to processing waste
- (B) Trash cannot affect the spinning performance and yarn quality
- (C) If the cotton has higher trash %, then the yarn realization will decrease
- (D) Finer fibres will have higher trash
- (E) Answer not known

151. The Antimicrobial activity is demonstrated by zones of inhibition on and around of antimicrobial finished fabrics according to

- (A) AATCC 147
- (B) AATCC 100
- (C) AATCC 30
- (D) AATCC 174
- (E) Answer not known

152. Which of the following statements are true about hand build finishing (stiffening)?

- (i) PVA (Polyvinyl alcohol) is used for non durable hand building finishing.
- (ii) Amylopectin in starch is the responsible group for obtaining hand build effects on textiles.
- (iii) Thermo set polymers will produce the durable hand build effect on textiles.

- (A) (i) only
- (B) (i) and (ii) only
- (C) (ii) and (iii) only
- (D) ☒ (i), (ii) and (iii)
- (E) Answer not known

153. From the following,

Identify durable flame retardants for cellulose materials,

- (A) Di ammonium phosphate
- (B) Mixture of boric acid and borax
- (C) Phosphoric acid
- (D) ☒ Tetrakis (hydroxymethyl) phosphonium chloride
- (E) Answer not known

154. Assertion [A] : Textiles are carriers of microorganism, such as pathogenic bacteria, odour generating bacteria, mould and fungi.

Reason [R] : If the environment is favourable certain bacteria can grow in a short time from a single germ to millions.

- (A) [A] is true but [R] is false
- ☒ (B) Both [A] and [R] are true and [R] is correct explanation of [A] is correct
- (C) [A] is false, [R] is true
- (D) Both [A] and [R] are true, but [R] is not correct explanation of [A] is correct
- (E) Answer not known

155. The relationship between SPF and fabric cover factor is

- ☒ (A) $\text{SPF}_{\max} = 1/(1 - \text{cover factor})$
- (B) $\text{SPF}_{\max} = 1/(1 + \text{cover factor})$
- (C) $\text{SPF}_{\min} = 1/(1 - \text{cover factor})$
- (D) $\text{SPF}_{\min} = 1/(1 + \text{cover factor})$
- (E) Answer not known

156. The surface energy of bleached cotton is

- ☒ (A) 44 mN/m
- (B) 30 mN/m
- (C) 29 mN/m
- (D) 18 mN/m
- (E) Answer not known

157. The permissible range limit of heavy metal content present in dyes is
- (A) 0.0001 to 100 mg/kg (B) 150 to 250 mg/kg
(C) 275 to 350 mg/kg (D) 375 to 500 mg/kg
(E) Answer not known
158. The cellulose acquires negative charges when dipped in water and dye acquires anion in both resulting repulsion between dye and cellulose ; the difference potential of dye and fibre is called
- (A) Zeta Potential (B) Hydrogen Bonding
(C) Covalent Bonding (D) Vander Waal forces
(E) Answer not known
159. Which one of the following chemical agent can act as a stabilizer during hydrogen peroxide bleaching?
- (A) Sodium silicate (B) Sodium citrate
(C) Sodium sulphate (D) Sodium permanganate
(E) Answer not known
160. Identify another name of printing process.
- (A) Localized dyeing (B) Pictorial colouring
(C) Multi colouring (D) Surface embellishment
(E) Answer not known

161. What effect does the turbulence in the air stream have on the filaments in the Reicofil system in spun bond production?
- (A) ✓ It randomizes the filament orientation in the web
 - (B) It increases filament alignment in the m/c direction
 - (C) It reduces the strength of the web
 - (D) It prevents entanglement of the filaments
 - (E) Answer not known
162. In Non woven fabric production, high punch density typically achieved by
- (A) Increasing humidity in the production area
 - (B) Decreasing the number of needles in the needle board
 - (C) ✓ Passing the fabric through multiple needle 100 m sequence
 - (D) Lowering the punch frequency of the 100 m
 - (E) Answer not known
163. In non woven manufacturing, the creping process used to
- (i) Increase the bulk
 - (ii) Increase the soft
 - (iii) Decrease the extensibility
 - (iv) Decrease the strength
- (A) ✓ (i) and (ii) only
 - (B) (i) and (iii) only
 - (C) (ii) and (iii) only
 - (D) (iii) and (iv) only
 - (E) Answer not known

164. What is the fundamental principle in knitted fabric manufacturing?

- (A) Interlocking threads with glue
- (B) Converting fibres directly into sheet
- (C) Interlocking two sets of yarns perpendicularly
- (D) ✓ Converting yarn into loops that intermesh
- (E) Answer not known

165. What is/are the purpose(s) of using float stitch in knitting?

- (i) To create open work effects
 - (ii) To hide unwanted colored yarn in jacquard design
 - (iii) To create embossed pattern on the fabric
- (A) (i) only
 - (B) ✓ (i) and (ii) only
 - (C) (iii) only
 - (D) (ii) and (iii) only
 - (E) Answer not known

166. How many needle beds does a rib knitting machine have?

- (i) Only one
 - (ii) Two
 - (iii) Three
- (A) (i) only
 - (B) ✓ (ii) only
 - (C) (iii) only
 - (D) (ii) and (iii) only
 - (E) Answer not known

167. Which type of lap produces a heavier, compact and less extensible fabric?

- (i) Open lap
- (ii) Closed lap
- (iii) Single lap

- (A) (i) only
- (C) (iii) only
- (E) Answer not known

- ☒ (B) (ii) only
- (D) (i) and (iii) only

168. Assume Peirce's geometry and circular yarn of 0.5 mm diameter. A square plain woven fabric with maximum sett would have _____ crimp.

- (A) 6%
- (C) 16%
- (E) Answer not known

- (B) 11%
- ☒ (D) 21%

169. Which of the following draft is preferred for fabric with high warp density?

- (A) Straight draft
- (C) Broken draft
- (E) Answer not known

- (B) Pointed draft
- ☒ (D) Skip draft

170. Which of the following statements are correct about fabric structure and properly relationship?

- (i) Fabric is deformed at low level of stain. The shear stiffness is initially large then decreases with increasing strain.
- (ii) Bending stiffness is not control fabric bending
- (iii) Frictional mechanism influences the shear behaviour.

- (A) (i) only
- (B) (i) and (iii) only
- (C) (i) and (ii) only
- (D) (ii) and (iii) only
- (E) Answer not known

171. In cam shedding mechanism, the maximum number of healds can be accommodate by

- (A) 8
- (B) 12
- (C) 18
- (D) 30
- (E) Answer not known

172. Torsion bar picking mechanism is used in

- (A) Rapier 100 m
- (B) Flexible rapier 100 m
- (C) Projectile 100 m
- (D) Air jet 100 m
- (E) Answer not known

173. Identify the element used to restrict width wise contraction in the warp sheet during beating-up.

- (A) Reed
- (B) Heald
- (C) Cloth fell
- (D) Temple
- (E) Answer not known

174. In ring spinning, drafting system is mostly inclined at an angle $\alpha =$

- (A) 40°
- (B) 45°
- (C) 50°
- (D) 51.5°
- (E) Answer not known

175. The Bin (or) Batch blending is mostly used in

- (A) Cotton industry
- (B) Synthetic industry
- (C) Jute industry
- (D) Woollen industry
- (E) Answer not known

176. _____ spinning system possesses the highest production rate.

- (A) Ring
- (B) Open End
- (C) Friction
- (D) Air jet
- (E) Answer not known

177. Assertion [A] : The rupture in a low twist yarn occurs in steps, with the individual filaments behaving independently of the others and each filament breaking when it reaches its breaking extension.

Reason [R] : The independent behaviour results due to high twist, form a sharp break of yarn.

- (A) [A] is true but [R] is false
- (B) Both [A] and [R] are true and [R] is the correct explanation of [A]
- (C) [A] is false, [R] is true
- (D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]
- (E) Answer not known

178. The diameter of medium wool varies from

- (A) 18 μm - 19 μm
- (B) 20 μm - 23 μm
- (C) 24 μm - 32 μm
- (D) 30 μm - 40 μm
- (E) Answer not known

179. Minimum how many warp beams are necessary for producing extra thread figured fabrics?

- (A) 1
- (B) 2
- (C) 3
- (D) 5
- (E) Answer not known

180. The felting process is done for

- (A) Silk
- (B) Rayon
- (C) Acrylic
- (D) Wool
- (E) Answer not known

181. The different types of prosthetic limbs are

- (A) Transhumeral, Transtibial and Transradial
- (B) Transtibial, Transfemoral and Transradial
- (C) Transtibial, Transhumeral and Transfemoral
- (D) Transhumeral, Transfemoral, Transtibial and Transradial
- (E) Answer not known

182. Which of the following are incorrect regarding Selective Compliance Assembly Robot Arm (SCARA)?

- (1) The characteristics of articulated and spherical configurations are combined.
 - (2) It has horizontal major axis notation.
 - (3) It is suitable for low speed and high precision.
 - (4) It provides less stiffness to the arm in the vertical direction.
- (A) 1 and 3 only (B) 2 and 4 only
(C) 1, 2 and 3 only (D) 1, 2, 3 and 4
(E) Answer not known

183. Which of the following does not come under the seven forms of waste in manufacturing identified by ohno?

- (A) Under production
- (B) Workers waiting
- (C) Excessive inventories
- (D) Unnecessary movement of people
- (E) Answer not known

184. In the work sampling

Basic time = 288 minutes

Rating = 90%

Relaxation allowance = 12.5%

Number of unit produced = 1000 units

Then the standard time per unit is

- (A) 291.6 minutes (B) 259.2 minutes
(C) 0.2916 minutes (D) 0.2592 minutes
(E) Answer not known

185. Which of the following assumptions is true as per McGregor Theory Y?

- (1) People will exercise self direction and self control.
- (2) Average human beings learn under proper condition.
- (A) 1 only
- (B) 2 only
- (C) Both 1 and 2
- (D) Neither 1 nor 2
- (E) Answer not known

186. Match the following turbines correctly with their direction of flow :

- | | |
|--------------------------|--------------------------------|
| (a) Kaplan turbine | 1. Outward radial flow turbine |
| (b) Francis turbine | 2. Inward radial flow turbine |
| (c) Pelton wheel turbine | 3. Axial flow turbine |
| (d) Fourneyron turbine | 4. Tangential flow turbine |

- | | | | | |
|-----|------------------|-----|-----|-----|
| | (a) | (b) | (c) | (d) |
| (A) | 3 | 2 | 4 | 1 |
| (B) | 3 | 1 | 2 | 4 |
| (C) | 4 | 1 | 3 | 2 |
| (D) | 4 | 2 | 3 | 1 |
| (E) | Answer not known | | | |

187. Which of the following statements are true for a Non-Newtonian fluid?

- (i) Shear stress is directly proportional to the rate of shear strain.
- (ii) Shear stress is not proportional to the rate of shear strain.
- (iii) Shear stress is not proportional to the velocity gradient.
- (A) (i) only
- (B) (i) and (ii) only
- (C) (i) and (iii) only
- (D) (ii) and (iii) only
- (E) Answer not known

188. Which of the following is incorrectly paired?

- (i) One stoke – $10^{-4} \text{ cm}^2 / \text{s}$
(ii) One poise – $\frac{0.1 \text{ N sec}}{\text{m}}$
(iii) Capillary rise – $\frac{40 \sin \theta}{Rgd}$
(iv) Bulk modulus – $\frac{\text{Increase in pressure}}{\text{Volumetric strain}}$

- (A) (i) only (B) (i), (ii) and (iii) only
(C) (i) and (iii) only (D) (ii) and (iii) only
(E) Answer not known

189. Which of the following statements are true regarding venturimeter and orificemeters?

1. Venturimeter is used for measuring flow rates of liquids only.
2. Orificemeter are used for measuring flow rates of all incompressible flows
3. In orificemeter, the entire potential energy of the fluid is converted into kinetic energy.

- (A) (i) only (B) (ii) only
(C) (iii) only (D) (ii) and (iii) only
(E) Answer not known

190. For dilatant fluid, the value of flow behaviour index (n) in equation

$$\tau = K \left(\frac{dV}{dy} \right)^n \text{ is}$$

- (A) less than 1
(B) ☒ greater than 1
(C) equal to 1
(D) equal to 0
(E) Answer not known

191. Which of the following are true about structure?

- (1) In the analysis of statically determinate structures consideration is given to the compatibility condition alone.
(2) In the analysis of statically indeterminant structures, consideration is given to both equilibrium and compatibility conditions.
(3) Forces satisfy the equilibrium conditions and the deformation satisfy the geometric requirement,
- (A) (1) and (3) only
(B) ☒ (2) and (3) only
(C) (1) and (2) only
(D) (1), (2) and (3)
(E) Answer not known

192. The work done on a unit volume of material, as a simple tensile force gradually increased from zero to proportional limit of the material is reached is termed as

- (A) Resilience
(B) Proof resilience
(C) ☒ Modulus of resilience
(D) Modulus of toughness
(E) Answer not known

193. The criterion of failure for design of components subjected to reverted stresses for infinite life and finite life respectively.

- (A) Endurance limit and S-N curve
- (B) S-N curve and Endurance limit
- (C) For both S-N curve
- (D) For both Endurance limit
- (E) Answer not known

194. Which of the following are incorrect regarding efficiency of square threaded screw?

- (1) It increases slowly upto helix angle 20° .
 - (2) It is maximum, when the helix angle between 40° to 45° .
 - (3) It decreases slowly when the helix angle exceed 60° .
 - (4) It increases as the coefficient of friction increases.
- (A) 1, 2 and 4 only (B) 1, 3 and 4 only
- (C) 2, 3 and 4 only (D) 1, 2 and 3 only
- (E) Answer not known

195. Match the type of bevel gears with their characteristics :

- | | |
|----------------------|-----------------------------|
| (a) Miter gears | 1. Pitch angle = 90° |
| (b) Crown gear | 2. Pitch angle = 45° |
| (c) Skew Bevel gears | 3. Curved teeth |
| (d) Hypoid gears | 4. Straight teeth |

- | | (a) | (b) | (c) | (d) |
|-----|------------------|-----|-----|-----|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 1 | 3 | 4 |
| (C) | 1 | 2 | 4 | 3 |
| (D) | 2 | 1 | 4 | 3 |
| (E) | Answer not known | | | |

196. The power of a governor has been estimated/evaluated by

- (A) Mean force exerted on the sleeve during change of speed
 (B) Product of Governor effort and displacement of sleeve
 (C) Maximum force exerted on the sleeve during change of speed
 (D) Ratio of Governor effort and displacement of sleeve
 (E) Answer not known

197. If the upper and lower arms of a porter governor are equal and are pivoted either on the governor axis or at equal distance from it. Then the ratio of height of porter governor to that of watt governor is equal to

(Note : W = Weight of sleeve

ω = Weight of the ball of governor)

- | | |
|---------------------------|---------------------------|
| (A) $W/[W - \omega]$ | (B) $[W - \omega]/W$ |
| (C) $\omega/[W + \omega]$ | (D) $[W + \omega]/\omega$ |
| (E) Answer not known | |

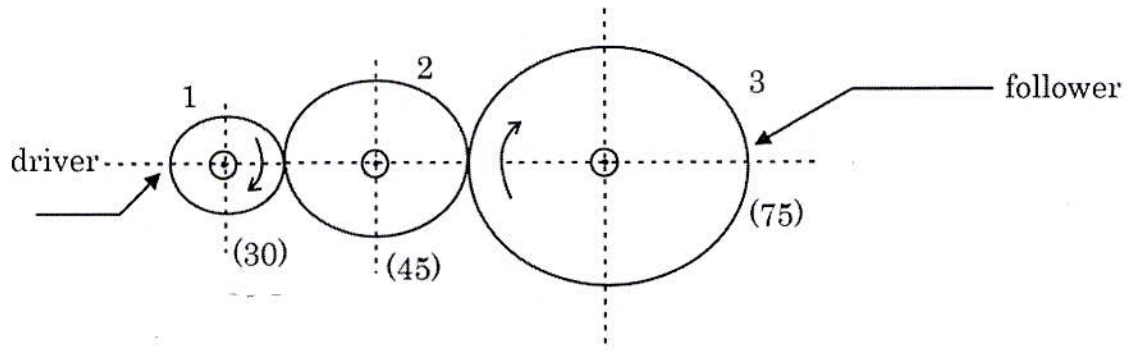
198. In order to have a complete balance of the several revolving masses in different planes,

- (A) the resultant forces must be zero
- (B) the resultant couple must be zero
- ☒ (C) both the resultant force and couple must be zero
- (D) none of the above
- (E) Answer not known

199. The swaying couple occurrence is due to (or) because of

- ☒ (A) Primary unbalanced force
- (B) Secondary unbalanced force
- (C) Two cylinders of locomotive
- (D) Single cylinder of locomotive
- (E) Answer not known

200. A simple gear train consist of three gears, each mounted on separate shaft as shown. The shafts are parallel. The gear 1 is the driver and gear 3 is the follower. Gear 1 rotating clockwise at a speed of 750 rpm. The number of teeth on gear 1, 2 and 3 are 30, 45 and 75 respectively. What is the speed ratio of the gear train?



- (A) 0.033
(C) 0.4
(E) Answer not known
(B) 2.5
(D) 1.5