

Sl. No. :

AEBOE/17

Register
Number

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2017

**BASICS OF ENGINEERING
(Degree Standard)**

Time Allowed : 3 Hours]

[Maximum Marks : 300

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. The applicant will be supplied with Question Booklet 15 minutes before commencement of the examination.
2. This Question Booklet contains 200 questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there and ensure there are no blank pages in the question booklet. In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.
3. Answer all questions. All questions carry equal marks.
4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
5. An answer sheet will be supplied to you, separately by the Invigilator to mark the answers.
6. You will also encode your Register Number, Subject Code, Question Booklet Sl. No. etc. with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.
7. Each question comprises *four* responses (A), (B), (C) and (D). You are to select **ONLY ONE** correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet there are four circles (A), (B), (C) and (D) against each question. To answer the questions you are to mark with Ball point pen **ONLY ONE** circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. e.g. If for any item, (B) is the correct answer, you have to mark as follows :

(A) ● (C) (D)
9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
10. The sheet before the last page of the Question Booklet can be used for Rough Work.
11. Do not tick-mark or mark the answers in the Question Booklet.
12. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

1. The volume bounded by the cylinder $x^2 + y^2 = 4$ and the planes $y + z = 4$ and $z = 0$ is
- (A) 8π (B) 16π
 (C) 4π (D) 2π
2. A unit normal vector of the surface $f(x, y, z) = 4(x^2 + y^2) - z^2$ at the point $(1, 0, 2)$ is
- (A) $\frac{2}{\sqrt{5}}\vec{i} + \frac{1}{\sqrt{5}}\vec{j}$ (B) $\frac{2}{\sqrt{5}}\vec{i} - \frac{1}{\sqrt{5}}\vec{k}$
 (C) $\frac{2}{\sqrt{5}}\vec{i} + \frac{1}{\sqrt{5}}\vec{k}$ (D) $-\frac{2}{\sqrt{5}}\vec{i} - \frac{1}{\sqrt{5}}\vec{j}$
3. The area of the region bounded by the curve $y = xe^{-x}$ and the x -axis from $x = 0$ to $x = 4$ is
- (A) $1 - 4e^{-5}$ (B) $1 + 5e^{-4}$
 (C) $1 - 5e^{-4}$ (D) $1 + 4e^{-5}$
4. The unit normal to the surface $x^2y + 2xy^2 = 8$ at the point $(1, 0, 2)$ is
- (A) $8\vec{i} - \vec{j} - 8\vec{k}/\sqrt{129}$ (B) $8\vec{i} + \vec{j} + 8\vec{k}/\sqrt{129}$
 (C) $8\vec{i} + \vec{j} + 8\vec{k}/\sqrt{125}$ (D) $-8\vec{i} - \vec{j} - 8\vec{k}/\sqrt{129}$
5. By using the Stoke's theorem the value of $\oint_C [e^x dx + 2y dy - dz]$, where C is the curve $x^2 + y^2 = 4, z = 2$, is
- (A) 0 (B) π
 (C) 2π (D) $\pi/2$
6. The image of the interior of the unit circle $|z| \leq 1$ under the mapping $w = (1+i)z + 2 - i$ is the
- (A) Exterior of the circle $|w - (2 - i)| = \sqrt{2}$
 (B) Interior of the circle $|w - (2 + i)| = \sqrt{2}$
 (C) Interior of the circle $|w - (2 - i)| = \sqrt{2}$
 (D) Exterior of the circle $|w - (2 + i)| = \sqrt{2}$

7. The Laplace transform of the function $f(t) = e^{-4t} t \sin 3t$ is
- (A) $\frac{6s}{(s^2 + 9)^2}$ (B) $\frac{6(s+4)}{(s+4)^2 + 9}$
 (C) $\frac{6(s+4)}{[s+4+9]^2}$ (D) $\frac{6(s+4)}{[(s+4)^2 + 9]^2}$
8. The Laplace transform of $\frac{e^{-2t} - e^{-3t}}{t}$ is _____
- (A) $\log \frac{s+3}{s+2}$ (B) $\log \frac{s-3}{s-2}$
 (C) $\log \frac{s+2}{s+3}$ (D) $\log \frac{s+2}{s+5}$
9. Which among the following bonds are not preferred in explosives
- (i) C = C (ii) N - O
 (iii) N - Cl (iv) C = N
- (A) (i) and (iii) (B) (i) and (iv)
 (C) (ii) and (iii) (D) (i), (iii) and (iv)
10. For which among the following substances, the degree of dissociation (α) is minimum in 1 M aqueous solutions?
- (A) NaOH (B) CH_3COOH
 (C) CH_3COONa (D) HCl
11. Stainless steel is resistant to corrosion because it is covered by
- (A) a dense and tough layer of iron oxide
 (B) a dense and tough layer of chromium oxide
 (C) a strongly adherent magnesium oxide
 (D) a brittle layer of nickel oxide
12. Which among the following polymers would have the highest glass transition temperature?
- (A) Polypropylene $(\text{CH}_2 - \underset{\text{CH}_3}{\text{CH}})_n$
 (B) Polyethylene $(\text{CH}_2 - \text{CH}_2)_n$
 (C) Polystyrene $(\text{CH}_2 - \underset{\text{C}_6\text{H}_5}{\text{CH}})_n$
 (D) Polyvinyl chloride $(\text{CH}_2 - \underset{\text{Cl}}{\text{CH}})_n$

13. The death of microorganisms upon the addition of chlorine to water is proposed to be due to the action of _____ with the enzymes and membranes of the organisms.
- (A) Chlorine (B) Hypochlorous acid
(C) Chloramines (D) Hypochlorite ions
14. Which among the following would result in three dimensional polymers?
- (i) Reaction between phenol and formaldehyde
(ii) Reaction between adipic acid and hexamethylene diamine
(iii) Reaction between styrene and divinyl benzene
(iv) Ring opening polymerisation of caprolactum
- (A) (i) and (ii) only
(B) (ii) and (iv) only
 (C) (i) and (iii) only
(D) (iv) only
15. Preferential corrosion of wire fencing at the places where the wires cross is due to
- (A) Galvanic corrosion
(B) Inter granular corrosion
 (C) Differential aeration corrosion
(D) Erosion corrosion
16. The metal which can be protected from corrosion by subjecting it to anodization is
- (A) Fe (B) Zn
(C) Cu (D) Al
17. Identify the special property of 'Invar' alloy
- (A) retaining hardness at red heat
 (B) zero coefficient of expansion
(C) corrosion resistance
(D) less brittleness

18. Supply the passive form for the following sentence :

We shall finish the whole work by six O'clock

- (A) The whole work will be finished by six O'clock
- (B) The whole work will be finished
- (C) By six O'clock we will finish the whole work
- (D) The whole work will be finished by us by six O'clock

19. Fill in the blank with the correct phrase.

The girl _____ is very pretty.

- (A) has long hair
- (B) who has a long hair
- (C) in long hair
- (D) with long hair

20. Fill in the blank with correct modal verb _____ you mind giving me the pen?

- (A) should
- (B) would
- (C) could
- (D) must

21. Give the interrogative form of the following sentence.

Their glory can never fade.

- (A) when will their glory fade?
- (B) when can their glory fade?
- (C) when would their glory fade?
- (D) when could their glory fade?

22. Select the appropriate word out of the given list that fits in the definitions.

Sent round to many places or persons.

- (A) Circular
- (B) Circumferential
- (C) Encyclical
- (D) Encyclopedic

23. The cross linking agent used during the synthesis of styrene based ion exchange resins is

- (A) divinyl benzene
- (B) formaldehyde
- (C) ethylene
- (D) a dicarboxylic acid

24. Match the words under Column A with the words under Column B to form compound words :

| Column A | | Column B | |
|----------|--|--------------|--|
| (a) key | | 1. humoured | |
| (b) boy | | 2. board | |
| (c) good | | 3. forgotten | |
| (d) long | | 4. hood | |

| | (a) | (b) | (c) | (d) |
|----------------|-----|-----|-----|-----|
| (A) | 2 | 1 | 4 | 3 |
| (B) | 1 | 4 | 2 | 3 |
| (C) | 2 | 4 | 1 | 3 |
| (D) | 3 | 4 | 1 | 2 |

25. Choose the option with the right meaning of the idiom given below :

to prick one's ears

- (A) to become alert
- (B) to pull together
- (C) to conclude from the obvious facts
- (D) to deliberate upon

26. Fill in the blanks with the correct question tag.

It's very hot today, _____

- (A) is it?
- (B) are it?
- (C) isn't it?
- (D) doesn't it?

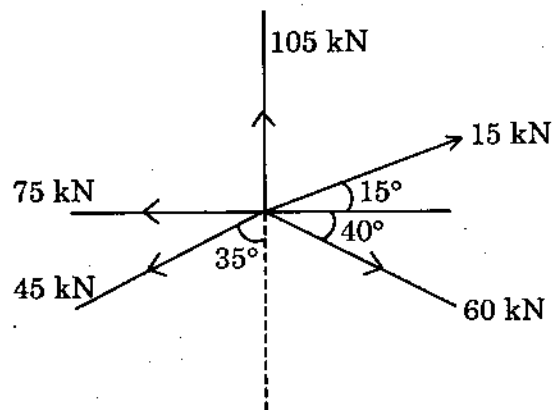
27. Choose the correct passive form of the sentence given below :

My cousin has drawn this picture.

- (A) This picture has been drawn by my cousin
- (B) This picture is drawn by my cousin
- (C) This picture had been drawn by my cousin
- (D) This picture was drawn by my cousin

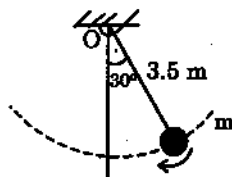
28. The sequence of events that happens during a typical fetch operation is
- (A) PC → MAR → Memory → MDR → IR
 - (B) PC → Memory → MDR → IR
 - (C) PC → Memory → IR
 - (D) PC → MAR → Memory → IR
29. Which of the following assembler directive reserves the indicated number of bytes for a data area?
- (A) END
 - (C) RESB
 - (B) BYTE
 - (D) RESW
30. The source statements written by the programmer are recognized as language constructs by
- (A) Semantic analysis
 - (B) Syntactic analysis
 - (C) Program analytics
 - (D) Construct analysis
31. What ITU – T stands for?
- (A) International Telecom Union – Telecom Standards Sector
 - (B) International Television Union – Terrain
 - (C) International Technology Union – Terrain
 - (D) Internet Topology Unit – Telecommunication Lt.
32. Internetworking Protocol (IP) is a
- (A) Unreliable and Connectionless Protocol
 - (B) Unreliable and Connection Oriented Protocol
 - (C) Reliable and Connection Oriented Protocol
 - (D) Reliable and Connectionless Protocol
33. Which layer of OSI model defines Duration of bits and synchronization of bits?
- (A) Data link layer
 - (B) Network layer
 - (C) Transport layer
 - (D) Physical layer

34. UML stands for
 (A) Unified Markup Language
 (B) Unified Modeling Language
 (C) Uniform Markup Language
 (D) Unique Markup Language
35. Which class of the classful address in Internet is designed for multicasting?
 (A) A
 (B) B
 (C) C
 (D) D
36. One Watt is equal to
 (A) 0.860 Kcal/h
 (B) 860 Kcal/h
 (C) 760 Kcal/h
 (D) 0.760 Kcal/h
37. If five forces act on a particle as shown in fig., the horizontal component of forces is



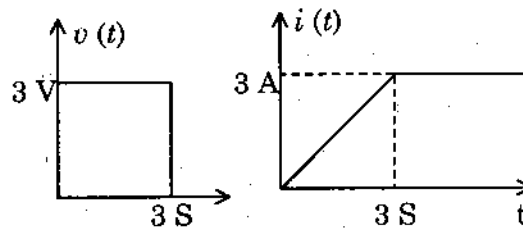
- (A) 33.453 kN
 (B) 32.482 kN
 (C) -40.359 kN
 (D) 42.510 kN
38. The forces which do not meet at a point are called
 (A) Non coplanar forces
 (B) Coplanar forces
 (C) Non-concurrent forces
 (D) Concurrent forces
39. Two forces P_1 and P_2 are acting at an angle θ , their resultant (R) is given by
 (A) $R = \sqrt{P_1^2 + P_2^2 + 2P_1P_2 \sin 2\theta}$
 (B) $R = \sqrt{P_1^2 + P_2^2 - 2P_1P_2 \cos \theta}$
 (C) $R = \sqrt{P_1^2 + P_2^2 + 2P_1P_2 \cos \theta}$
 (D) $R = \sqrt{P_1^2 + P_2^2 + 2P_1P_2 \cos 2\theta}$
40. Dry friction is also known as
 (A) Ladder friction
 (B) Coulomb friction
 (C) Wedge friction
 (D) Belt friction

41. A projectile is fired at an angle α to the horizontal. Its horizontal range will be maximum when α is
- (A) 30° (B) 45°
 (C) 60° (D) 90°
42. If ' R ' is the range of the projectile on a horizontal plane and ' h ' is the maximum height, then the maximum horizontal range with the same velocity of projection is
- (A) $h + \left(\frac{R^2}{8h}\right)$ (B) $2h + (8R^2h)$
 (C) $h + 8R^2h$ (D) $2h + \left(\frac{R^2}{8h}\right)$
43. A body is projected horizontally from the top of a building 30 m high. The time taken by it to reach the ground is
- (A) 2.47 sec (B) 24.7 sec
 (C) 30 sec (D) 33.2 sec
44. The bob of a pendulum, 3.5 m long, describes an arc of a circle in vertical plane. If the tension in the string is 2.5 times the weight of the bob for the position shown, the velocity of the bob in that position will be



- (A) 7.49 m/sec (B) 8.26 m/sec
 (C) 6.42 m/sec (D) 10.27 m/sec
45. Two particles of masses 2 Kg and 10 Kg are moving with equal linear momentum. The ratio of kinetic energy is
- (A) 5 (B) 20
 (C) 8 (D) 10
46. A bullet of mass ' m ' moving with a velocity ' v ' strikes a suspended wooden block of mass ' M '. The initial velocity at which the block rises to a height ' h ' is
- (A) $\frac{(M+m)}{m} \sqrt{2gh}$ (B) $\frac{(M+2m)}{m} \sqrt{2gh}$
 (C) $\frac{M}{(m+M)} \sqrt{2gh}$ (D) $\frac{m}{(m+M)} \sqrt{2gh}$

47. The voltage and current waveforms of a network element are shown in figs. The network element and its value are respectively.

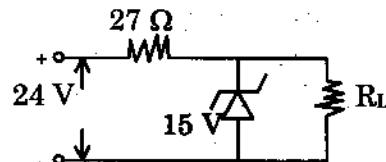


- (A) Inductor, 3H (B) Capacitor, $\frac{1}{3}$ F
 (C) Inductor, 1H (D) Capacitor, 1F
48. An alternating current is represented by $i = I_m \sin \omega t$. Here 'i' represents
 (A) Maximum value of ac current (B) Average value of ac current
 (C) RMS value of ac current (D) Instantaneous value of ac current
49. The form factor of half wave rectified alternating current represented by $i = 20 \sin \omega t$ is
 (A) 1.11 (B) 1.570
 (C) 2.20 (D) 3.0
50. An air cored coil with a resistance of 22.23Ω and reactance of 62.854Ω is connected to an ac supply. If it draws a current of 3 A, the power dissipated by the coil would be
 (A) 66.69 W (B) 200 W
 (C) 255.25 W (D) 266.22 W
51. A circuit has 3 parallel branches, one of resistance, one of inductance reactance and one of capacitive reactance. The branch currents are, $I_r = 0.6 \angle 0^\circ$ A, $I_L = 4.8 \angle -90^\circ$ A, $I_C = 6 \angle 90^\circ$ A. The total current would be
 (A) $6.6 - j 4.8$ (B) $0.6 - j1.2$
 (C) $6.6 - j1.2$ (D) $0.6 + j1.2$

52. A single phase motor is running in a particular direction, with respect to double field revolving theory, we can say that
- (A) both rotating fields (rotating in opposite direction) have same strength
 - (B) forward rotating field is slightly stronger than backward rotating field
 - (C) forward rotating field is slightly weaker than backward rotating field
 - (D) backward rotating field is absent

53. The ripple factor of a full-wave rectifier is
- (A) 1.21
 - (B) 0.482
 - (C) 0.406
 - (D) 0.121

54. Fig. shows Zener regulated DC power supply. The minimum value of R_L to which the output voltage remains constant is



- (A) 45Ω
- (B) 15Ω
- (C) 24Ω
- (D) 27Ω

55. In Boolean Algebra, $1 + A + B + C$ is equal to
- (A) A
 - (B) 1
 - (C) $1 + A$
 - (D) $1 + 3A$

56. In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of
- (A) Light Collection
 - (B) Light Scattering
 - (C) Light Dispersion
 - (D) Light Polarization

57. John is the CEO of a major hospital. He has spent his day planning the schedules of employees for the next month. He had to ensure that there was a registered nurse on every shift. He spent his day in
- (A) Planning (B) Organising
(C) Leading (D) Controlling
58. Peter Drucker stated that, 'One of the greatest advantages of MBO' is to
- (A) Motivate the Managers
(B) Motivate the Policy
(C) Motivate the Board
(D) Motivate the Organisational Roles
59. Quantitative aspects of Manpower Planning determine of the right number of personnel required for _____ in an organisation.
- (A) Each Job (B) Specific Job
(C) Analysing Job (D) Designing Job
60. Mayo and his associates underscored the need for a greater and deeper understanding of the
- (A) economic needs of workers
(B) welfare of workers
(C) social and behavioural aspects of management
(D) democratic needs of workers
61. The easiest approach to fillup a vacancy is
- (A) Transfer (B) Promotion
(C) Gate hiring (D) Labour union
62. What is measurementship?
- (A) Discussing "the numbers" at every opportunity
(B) Trying to agree low objectives so as to look good later
(C) Surveying by naval architects
(D) Collecting too much performance data

63. Find out the correct method of planning work in an organisation
- (A) External sources, Internal sources, Capacity to work
 - (B) Checklist, Scheduling, Work programme and Action sheets
 - (C) Esteem needs, Social needs, Safety needs
 - (D) Motivation, Manpower, Management
64. Training can not improve performance problems arising out of
- (A) Bad Management, Poor recruitment and Poor Job design
 - (B) Empowerment, Training need Assessment
 - (C) Organisational culture and social issues
 - (D) Multi skilling
65. Development is "The growth or realisation of a person's ability and potential through the provision of learning and educational experiences", which is defined by
- (A) Maslow
 - (B) Herzberg
 - (C) Vroom
 - (D) Armstrong
66. Performance Test is also known as
- (A) Trade Test
 - (B) Aptitude Test
 - (C) Personality Test
 - (D) Intelligence Test
67. _____ is the number of subordinates who report directly to a specific manager
- (A) Span of control
 - (B) Span of correction
 - (C) Span of co-ordination
 - (D) Span of checking
68. Total Quality Management requires
- (A) A committed and involved Management to provide long-term top-to-bottom organizational support
 - (B) An unwavering focus on the customer, both Internally and externally
 - (C) Treating suppliers as partners
 - (D) All of the above

69. Formula for Equipment effectiveness
- (A) Equipment availability × Performance efficiency × Rate of Quality products
 - (B) $\frac{\text{Equipment availability} \times \text{Rate of Quality products}}{\text{Performance efficiency}}$
 - (C) $\frac{\text{Equipment availability} \times \text{Performance efficiency}}{\text{Rate of Quality products}}$
 - (D) Rate of Quality products × Planned operating time × Equipment availability
70. What does the TQMEX model of quality management advocate?
- (A) Quality improvement
 - (B) Integrated approach for managing quality
 - (C) Quality control
 - (D) Total preventive maintenance
71. Which of the following is not a part of "Downtime losses"?
- (A) Start-ups
 - (B) Shift changes
 - (C) Planned Maintenance shutdowns
 - (D) Lack of material
72. The core concept of Quality Circle is
- (A) Top down approach
 - (B) Participative Management
 - (C) Recognition of wealth
 - (D) Forced membership
73. Which of the following is correct hierarchy of needs?
- (A) Survival, security, esteem, social, self actualization
 - (B) Survival, security, social, esteem, self actualization
 - (C) Security, survival, social, esteem, self actualization
 - (D) Security, survival, esteem, social, self actualization

74. A team has performed QFD. They have found that one of the rows in the relationship matrix is blank. The team should
- (A) Interview the customers again to verify correctness of the CTQs.
 - (B) Review the concept and add some features to the product to satisfy the corresponding CTQs.
 - (C) Take note of this but need not take any action.
 - (D) Realise that the corresponding CTQ, has little importance to the customer
75. Designing predictive quality into products is the focus of which of the following?
- (A) Design for six sigma
 - (B) Just in time
 - (C) Lean management
 - (D) DMAIC
76. Which of the following is most common criticism of bench marking?
- (A) In bench marking, we are copying others
 - (B) Bench marking is an expensive process
 - (C) Bench marking exists in theory but cannot be practiced
 - (D) Bench marking requires commitment of top management
77. The three elements namely 'will capacity and focus' needed to transform the organisation is the focus of which of the models?
- (A) Capacity maturity model
 - (B) Smith and Tosey capacity model
 - (C) Corporate maturity model
 - (D) Kaizen
78. The following are the matched pairs of major components w.r.t composition of clean and dry air near sea-level.
- Identify the correct pair in terms of percent by volume
- (A) 78.09% of O₂ - 20.94% N₂
 - (B) 68% O₂ - 32% N₂
 - (C) 78.09% N₂ - 20.94% O₂
 - (D) 78.09% H₂O - 20.94% O₂

79. The term green house effect was coined by
- (A) U.S. Pilots (B) Robert Angus Smith
 (C) J. Fourier (D) L.D. Meyer
80. The green house gases among the following are
- (i) Methane (ii) Carbon dioxide
(iii) Water vapour (iv) Chloro fluoro carbons
(A) (ii) only (B) (i) and (ii) only
(C) (i), (ii) and (iv) only (D) (i), (ii), (iii) and (iv)
81. The property of aerosols which help in the separation of dust and particulate matter from industries employing Cottrell precipitator is
- (A) They are colloidal particles having nanometer dimensions
 (B) They are charged particles and they are robbed of their charges when coming into contact with electrodes
(C) They are heavier particles and move outward by centrifugal force and get deposited on the wall of the collector
(D) They are attracted by sun light and coalesce in to bigger particles
82. The mixture of smoke, fog and Sulphur dioxide is called as
- (A) Los Angeles smog (B) Oxidising smog
 (C) Reducing smog (D) Redox smog
83. Choose the correct answers
- (i) Polyphosphates are fillers added to detergents
(ii) Phosphates serve as nutrients for algae
(iii) Presence of phosphates in water bodies lead to eutropication
(iv) Presence of higher amounts of phosphates in water bodies is advantageous
(A) (i) and (iii) are correct
(B) (i) and (iv) are correct
 (C) (i), (ii) and (iii) are correct
(D) (iv) alone is correct

84. Which of the following pairs is not correctly matched

TLVs of different noise levels.

| | dB | Maximum allowable exposure time per day |
|-------------------------------------|-----|---|
| (A) | 95 | 4 hours |
| (B) | 100 | 2 hours |
| (C) | 115 | 15 min |
| <input checked="" type="checkbox"/> | 90 | 6 hours |

85. Pollutant of air have a greater impact on weather due to

- (A) High burning of fossil-fuels (B) Imbalance in natural air-conditioning
(C) Reduced dilution of gases (D) Inappropriate topography

86. Which of the following devices is suitable for the removal of gaseous pollutants?

- (A) Cyclone separator (B) Electronic precipitator
(C) Fabric filler (D) Wet scrubber

87. A block of mass 2 kg placed on a long frictionless horizontal table is pulled horizontally by a constant force F. It is found to move 10 m in the first 2 seconds. Find the magnitude of the force.

- (A) 10 N (B) 40 N (C) 14 N (D) 1 N

88. A steel wire of 1 m long and 1 sq mm in cross section having Youngs modulus 1.24×10^{11} Pascal. How much work is done in stretching it through 1 mm?

- (A) 1.24 Joule (B) 0.124 Joule
(C) 2.48 Joule (D) 0.0124 Joule

89. A hall has a volume 4530 m^3 . Its absorption is equivalent to 185.8 m^2 of open window. If the audience filler the hall and the absorption is increased by another 185.8 m^2 , then the reverberation time is

- (A) Half of its initial value (B) Same as that of original
(C) Double of its initial value (D) Four time that of initial value

90. In double refraction, generally we get two refracted rays for each incident ray and
- (A) Both the refracted rays are plane polarised
 - (B) One refracted ray is plane polarised the other is not
 - (C) Neither is polarised
 - (D) One refracted ray is completely plane polarised and the other is partially polarised
91. Assertion (A) : Laser light is monochromatic and coherent in nature
Reason (R) : Laser light is highly directional in nature
- (A) Both (A) and (R) are correct
 - (B) (A) is true and (R) is false
 - (C) Both (A) and (R) are false
 - (D) (A) is false and (R) is true
92. In the optical fibers, the refractive index of core is n_1 and the refractive index of cladding is n_2 then
- (A) $n_1 < n_2$
 - (B) $n_1 > n_2$
 - (C) $n_1 = n_2$
 - (D) $n_1 = n_2 = 1.5$
93. The angular momentum of the electron in hydrogen atom can be possibly be
- (A) $\frac{\lambda}{2}$
 - (B) $h/2\pi$
 - (C) $2\pi/h$
 - (D) $\frac{2}{h}$
94. Isotopes of a given element must have the same
- (A) Atomic weight
 - (B) Molecular weight
 - (C) Number of protons in the nucleus
 - (D) Number of neutrons in the nucleus
95. The unit of activity of a radioactive material is
- (A) Weber
 - (B) Tesla
 - (C) Becquerel
 - (D) Henry/m

96. The scalar λ is a characteristic root of the matrix A if
- (A) $(A - \lambda I)$ is non-singular (B) $(A - \lambda I)$ is singular
 (C) A is non-singular (D) A is singular
97. The solution of the initial value problem $y'' + y' - 2y = 0$, given $y(0) = 3$, $y'(0) = 0$ is
- (A) $y = e^x + 2e^{-2x}$ (B) $y = -2e^x + e^{-2x}$
 (C) $y = 2e^x + e^{-2x}$ (D) $y = 2e^x - e^{-2x}$
98. If $u = \cos ax$ and $v = \sin ax$ then the Wronskian of u and v are
- (A) 0 (B) 1
 (C) a (D) a^2
99. Let $D = \frac{d}{dx}$, then the value of $\left\{ \frac{1}{xD + 1} \right\} x^{-1}$ is
- (A) $\log x$ (B) $\frac{(\log x)}{x}$
 (C) $\frac{(\log x)}{x^2}$ (D) $\frac{(\log x)}{x^3}$
100. If $u = 2axy, v = a(x^2 - y^2)$ where $x = r \cos \theta$; $y = r \sin \theta$ then $\frac{\partial(u, v)}{\partial(r, \theta)}$ is equal to
- (A) $4a^2r^2$ (B) $4a^2r$
 (C) $-4a^2r^3$ (D) $-4a^2r^2$
101. The altitude of a right circular cone is 15 cm and is increasing at 0.2 cm/sec. The radius of the base is 10 cm and is decreasing at 0.3 cm/sec. How fast is the volume changing?
- (A) $-\frac{80}{3}\pi$ (B) $-\frac{70}{3}\pi$
 (C) $-\frac{70}{3}$ (D) $\frac{70}{3}$
102. If $u = \log\left(\frac{x^4 + y^4}{x + y}\right)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is
- (A) $3u$ (B) 3
 (C) u (D) $\frac{3}{u}$

103. The invariant points of $w = \frac{z-3}{z+1}$ are

- (A) $\pm i\sqrt{3}$ (B) $\pm\sqrt{3}$
(C) ± 3 (D) $\pm 3i$

104. The function $w = \log z$ is

- (A) Analytic in the complex plane everywhere
 (B) Analytic in the complex plane except of the origin
(C) Not analytic function
(D) Analytic function at the origin

105. Sum of the residues of $\frac{2z+1}{z^2-z-2}$ at its poles is

- (A) 4 (B) 2
(C) $\frac{5}{3}$ (D) $\frac{1}{3}$

106. The value of the integral $\int_C \frac{z^2+4}{z^3+2z^2+2z} dz$ where C is $|z|=1$ is

- (A) $2\pi i$ (B) 0
 (C) $4\pi i$ (D) πi

107. The solution of the differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x$ with integral constant 'C' is

- (A) $y = (\tan x - 1) + C \tan^{-1} x$
 (B) $y = (\tan x - 1) + C e^{-\tan x}$
(C) $y = (\tan x + 1) + C e^{\tan x}$
(D) $y = (\tan x + 1) + C \tan x$

108. Choose the mismatch of the following
- | | | |
|-------------------------------------|---------------------------|-------------------------------|
| (A) | Oildag | - Internal combustion engines |
| (B) | Molybdenum disulphide | - sandwich structure |
| (C) | Hydrocarbon oils | - watches |
| <input checked="" type="checkbox"/> | Glycerides of fatty acids | - sewing machines |
109. The calorific value of brown coals lie in the range of _____.
- | | | |
|-------------------------------------|---------------------|-------------------------|
| <input checked="" type="checkbox"/> | 6500 – 7000 Kcal/kg | (B) 8000 – 8500 Kcal/kg |
| (C) | 8500 – 8600 Kcal/kg | (D) 8650 – 8700 Kcal/kg |
110. Which among the following can withstand upto 2500°C?
- | | | |
|-----|--------------|--|
| (A) | High alumina | (B) Dolomite |
| (C) | Chromite | <input checked="" type="checkbox"/> Zirconia |
111. Which one of the following is formed (as a green film) when copper is exposed to moist air containing CO₂?
- | | | |
|-------------------------------------|---|---|
| <input checked="" type="checkbox"/> | CuCO ₃ + Cu(OH) ₂ | (B) Cu ₂ CO ₃ + Cu(OH) ₂ |
| (C) | CuCO ₃ + Cu(OH) | (D) CuSO ₄ + Cu(OH) ₂ |
112. What is the gross calorific value of 1 kg of carbon? Given that, C_(s) + O₂(g) → CO₂(g), ΔH = -394 kJ/mol. Atomic weight of carbon is 12.
- | | | |
|-------------------------------------|---------------|--------------------|
| <input checked="" type="checkbox"/> | 7,847 kcal/kg | (B) 3,200 kcal/kg |
| (C) | 3,940 kcal/kg | (D) 12,000 kcal/kg |
113. Ground water acquires calcium and magnesium bicarbonate hardness because of
- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | the dissolution of calcium and magnesium carbonates in water containing dissolved CO ₂ |
| (B) | the hydrolysis of CaSO ₄ and MgSO ₄ with water containing dissolved CO ₂ |
| (C) | the hydrolysis of CaCO ₃ and MgCO ₃ by water containing dissolved O ₂ |
| (D) | the reaction of calcium and magnesium silicates with water containing dissolved CO ₂ |
114. Which of the following is not true?
- | | |
|-------------------------------------|--|
| (A) | PVC is a tough polymer |
| (B) | Teflon is a non-sticky polymer |
| (C) | Clay is a thermosetting polymer |
| <input checked="" type="checkbox"/> | Urea-formaldehyde is a thermosetting polymer |

115. Which of the following is the strongest reducing agent?

Given $\epsilon_{\text{zn}^{2+}/\text{zn}}^{\circ} = -0.762 \text{ V}$; $\epsilon_{\text{cr}^{3+}/\text{cr}}^{\circ} = -0.74 \text{ V}$

$\epsilon_{\text{Fe}^{3+}/\text{Fe}^{2+}}^{\circ} = +0.77 \text{ V}$

- (A) Zn
(C) H₂
(B) Cr
(D) Fe²⁺

116. Which of the following is not a primary explosive?

- (A) Mercury fulminate
(C) Lead azide
(B) Tetracene
 (D) TNT

117. Corundum is made up of

- (A) SiO₂
(C) SiC
(B) B₄C
 (D) Al₂O₃

118. The compound, tricresyl phosphate is used in petroleum oil lubricants for reducing

- (A) Waxing in oils
(C) Emulsification
 (B) Abrasion
(D) Foam formation

119. Pick out the correct meaning of the idiomatic expression given below

rain cats and dogs

- (A) Secretly
(C) Run away
 (B) Rain heavily
(D) Very violent

120. Identify the sentence with the wrong question tag :

- (A) Amala plays tennis, doesn't she?
 (B) It is a book, is it?
(C) I am not a boy, am I?
(D) I am reading a book, aren't I?

121. The phrase In vogue signifies

- (A) in search of
 (B) in fashion
(C) close relations
(D) in all places

122. Give a suitable title to the given passage.

By this tomorrow, and everyday, there will be added to the earth about 12,000 extra people – just about the population of the city of York.

- (A) Child birth
(B) Population menace
(C) Growing people
(D) World population

123. Give one word substitute for "a person who does not accept all the rules and codes".

- (A) Altruist
(B) Anarchist
(C) Agnostic
(D) Ambivert

124. Supply antonym for the following word :

Plethora

- (A) Shortage
(B) Weakness
(C) Sickness
(D) Smallness

125. Expressions such as 'Yours faithfully', 'Yours truly', 'Yours affectionately' are termed as

- (A) Salutation
(B) Subscription
(C) Reference
(D) Direction

126. Choose the correct synonym of the word underlined in the following sentence.

Her Seraphic semblance was worshipped by one and all

- (A) good
(B) beautiful
(C) angelic
(D) demoniac

127. Rearrange the jumbled sentences in the following passages.

S1 Venice is a strange and beautiful city in the north of Italy

S6 This is because Venice has no streets

P. There are about four hundred old stone bridges joining the islands of Venice

Q. In this city there are no motor – cars, no horses and no buses

R. These small islands are near one another

S. It is not one island but a hundred and seventeen islands

- (A) Q P R S
(B) S R P Q
(C) S P Q R
(D) Q S P R

128. Fill in the blanks with the correct verb forms from the options given :

While I _____ at the star - studded sky, my friend arrived.

- (A) had been gazing (B) has been gazing
 (C) was gazing (D) is gazing

129. Which of the following activates one of the registers to load inputs?

- (A) Multiplexer (B) Encoder
 (C) Decoder (D) ALU

130. The performance of cache memory is frequently measured in terms of

- (A) Turn around time (B) Latency time
(C) Miss ratio (D) Hit ratio

131. Stack is a

- (i) Storage device that stores information in Last-in-First-out manner.
(ii) Stack is associated with an address register.
(iii) Stack can perform any operation.
 (A) (i) and (ii) (B) (i) only
(C) (ii) and (iii) (D) (i) and (ii) and (iii)

132. Given two binary numbers

A = 10011100 B = 10101010

$R \leftarrow (A \text{ AND } (\text{Shl } B)) \text{ XOR } A$

After executing the statement, content of R will be :

- (A) 10000010 (B) 11110000
 (C) 10001000 (D) 00011100

133. For a computer with main-memory capacity of 32 K words ($K = 1024$), how many bits are needed to specify a physical address in memory?

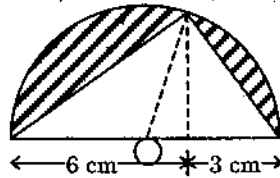
- (A) 20 bits (B) 15 bits
(C) 32 bits (D) 16 bits

134. In Ethernet LAN, NIC stands for
- (A) National Interface Card
 - (B) Node Interface Card
 - (C) Network Interface Card
 - (D) Network Internet Card
135. Cellular phones are working in the band of
- (A) High frequency
 - (B) Very high frequency
 - (C) Ultra high frequency
 - (D) Super high frequency
136. To design a cross-bar switch, how many cross points are required to connect n inputs to m outputs?
- (A) n/m
 - (B) $2n \times m$
 - (C) $n + m$
 - (D) $n \times m$
137. Which of the following device is a protocol converter?
- (A) Bridges
 - (B) Routers
 - (C) Switches
 - (D) Gateways
138. A piece of C language code :
- ```

for (i = 0; i < 50; i = i + 3)
{
 Printf ("I am Repeated");
}

```
- How many times "I am Repeated" is printed?
- (A) 17
  - (B) 13
  - (C) 11
  - (D) 10

139. Centroid of the area shown in figure is



(A)  $\bar{x} = 3.524 \text{ cm}$ ,  $\bar{y} = 2.242 \text{ cm}$

(C)  $\bar{x} = 3.623 \text{ cm}$ ,  $\bar{y} = 2.416 \text{ cm}$

(B)  $\bar{x} = 3.749 \text{ cm}$ ,  $\bar{y} = 2.655 \text{ cm}$

(D)  $\bar{x} = 3.842 \text{ cm}$ ,  $\bar{y} = 2.522 \text{ cm}$

140. Moment of Inertia of solid sphere is

(A)  $\frac{Mr^2}{2}$

(B)  $\frac{3}{2}Mr^2$

(C)  $\frac{2}{5}Mr^2$

(D)  $\frac{5}{2}Mr^2$

141. Velocity of a moving body

(A) is a vector quantity

(B) is a scalar quantity

(C) is a constant quantity

(D) involves magnitude only

142. In which among the following metallic coatings, the coat metal is anodic to the base metal?

(A) Coating of zinc over iron

(B) Coating of copper over iron

(C) Silver over copper

(D) Gold over copper

143. The acceleration due to gravity of a particle falling towards earth is  $a = -\frac{gR^2}{r^2}$  where 'r' is the distance from the centre of earth to the particle. 'R' is the radius of the earth and 'g' is acceleration due to gravity. The escape velocity when the particle is projected from surface of the earth is

(A)  $V_e = \sqrt{2gR}$

(B)  $V_e = \frac{1}{\sqrt{2gR}}$

(C)  $V_e = \frac{R}{\sqrt{2g}}$

(D)  $V_e = \frac{\sqrt{2g}}{R}$

144. A stone is dropped into a well 70.75 m deep. The time after which the sound be heard, if the velocity of sound is 350 m/s is

(A) 3 sec

(B) 4 sec

(C) 5 sec

(D) 6 sec

145. The kinetic energy due to rotation of a body is equal to

- (A)  $\frac{1}{2} I\omega^2$  (B)  $\frac{1}{2} m\omega^2$   
(C)  $2 I\omega^2$  (D)  $\frac{1}{2} I^2\omega$

146. The conditions of equilibrium for coplanar non-concurrent forces are

- (A)  $\Sigma H = 0, \Sigma V = 0$   
(B)  $\Sigma H = 0, \Sigma M = 0$   
(C)  $\Sigma V = 0, \Sigma M = 0$   
 (D)  $\Sigma H = 0, \Sigma V = 0, \Sigma M = 0$

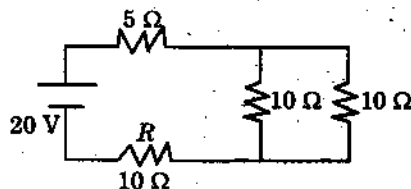
147. A car weighing 49050 N climbs up a hill that rises 1 in 25 m of its length at the rate of 72 Km/h. Neglecting friction, minimum power developed is

- (A) 40875 W (B) 42170 W  
(C) 40000 W (D) 41750 W

148. With 4 resistances connected in parallel, if each dissipates 10 W, the total power supplied by the voltage source equals

- (A) 400 W (B) 100 W  
 (C) 40 W (D) 10 W

149. For the given circuit, the voltage drop across resistance 'R' would be



- (A) 8 V (B)  10 V  
(C) 12 V (D) 15 V



155. At 100% modulation, the power in power each sideband is \_\_\_\_\_ of that of carrier.
- (A) 50% (B) 40%  
(C) 60%  (D) 25%
156. The frequency of the Stereo Subcarrier Signal in FM broadcasting is
- (A) 19 KHz (B)  38 KHz  
(C) 50 KHz (D) 76 KHz
157. The IF is 455 KHz, If the radio receiver is tuned to 855 KHz, the local oscillator frequency is
- (A) 455 KHz (B)  1310 KHz  
(C) 1500 KHz (D) 1520 KHz
158. In what order do managers typically perform the managerial functions?
- (A) Organising, Planning, Controlling, Leading  
(B) Organising, Leading, Planning, Controlling  
 (C) Planning, Organising, Leading, Controlling  
(D) Planning, Organising, Controlling, Leading
159. Decentralization is a fundamental aspect of
- (A) Authority (B) Responsibility  
(C) Duty  (D) Delegation
160. What is the Guiding principle of Scientific Management?
- (A) Experimentation  
(B) Fluid working relationships  
(C) Freedom of Association  
 (D) One best way to do a job
161. Job Analysis, Job description, Job specification and Job evaluation are the major activities of
- (A) Organizational Planning  
(B) External Planning  
 (C) Manpower Planning  
(D) Importance of Planning

162. Organisation's activities involve a variety of

- (A) People, tasks, resources and technologies
- (B) Timing, directions and resources
- (C) Team, work and strategy
- (D) Objectives, goals and Mission

163. Efficiency can be expressed as

- (A)  $\frac{\text{Output}}{\text{Input}}$  relationship
- (B)  $\frac{\text{Input}}{\text{Output}}$  relationship
- (C)  $\frac{\text{Target}}{\text{Objectives}}$  relationship
- (D)  $\frac{\text{Materials}}{\text{Employees}}$  relationship

164. Organisation chart shows only \_\_\_\_\_ relationships.

- (A) Informal
- (B) Formal
- (C) Sideward
- (D) Downward

165. Match the following :

|     | Names               |    | Year |
|-----|---------------------|----|------|
| (a) | F.W. Taylor born in | 1. | 1771 |
| (b) | Robert Owen born in | 2. | 1841 |
| (c) | Henry Fayol born in | 3. | 1880 |
| (d) | Elton Mayo born in  | 4. | 1856 |

- (A) (a) 4 (b) 1 (c) 2 (d) 3
- (B) (a) 2 (b) 3 (c) 4 (d) 1
- (C) (a) 1 (b) 2 (c) 3 (d) 4
- (D) (a) 3 (b) 4 (c) 1 (d) 2

166. The ability to work well with other people both individually and in a group is called

- (A) Technical skill
- (B) Human skill
- (C) Conceptual skill
- (D) Behavioural skill



172. Sequential Sampling is an extension of which of this sample plan
- (A) Single sampling plan
  - (B) Double sampling plan
  - (C) Multiple sampling plan
  - (D) Blind sampling plan
173. 360 degree performance appraisals refer to
- (A) Non-monetary forms of recognition to acknowledge achievement of quality improvement goals
  - (B) Individual based performance system
  - (C) Quality based performance appraisals
  - (D) Feedback from coworkers subordinates or customers is incorporated into performance appraisals
174. The total quality management philosophy that focuses on the components planning, control and improvement was developed by whom?
- (A) Edward Dening
  - (B) Joseph M. Juran
  - (C) Walt S. Shewhart
  - (D) David Ricardo
175. Which of the following is not a prevention cost?
- (A) Design review
  - (B) Final inspection
  - (C) Purchase order review
  - (D) Capability review
176. DMAIC is a problem solving approach used in which of these?
- (A) Kaizen
  - (B) 5 S model
  - (C) Six sigma
  - (D) Fishbone model



177. Which of the following is the initiator for formation of photochemical smog?
- (A) Ozone (B) Nitrogen oxide  
(C) Volatile hydrocarbons  (D) Sunlight
178. Gaseous pollutants are Gaseous in nature
- (A) at low temp and low pressure  
(B) at boiling point and high pressure  
(C) at normal temperature and high pressure  
 (D) at normal temperature and pressure
179. Darkening effect of 'Taj Mahal' is due to (1)  $\text{NO}_x$  (2) CO (3)  $\text{CO}_2$  (4)  $\text{SO}_2$ . Select your answer accordingly to the coding scheme given below
- (A) 1 and 2 are correct (B) 1 and 3 are correct  
(C) Only 3 is correct  (D) Only 4 is correct
180. The automobile exhaust consists excess of \_\_\_\_\_ gas
- (A)  $\text{CO}_2$  (B)  $\text{O}_2$   
 (C) CO (D)  $\text{CH}_4$
181. The species which consume  $\text{O}_3$  present in the atmosphere are
- (i) NO  
(ii) Cl  
(iii)  $\text{O}_2$   
(iv)  $\text{H}_2\text{O}$
- (A) (ii) only  
(B) (ii) only (iii) only  
 (C) (i) and (ii) only  
(D) (i), (ii) and (iii) only

182. The biological process among the waste water treatment methods is
- (A) Coagulation process (B) Neutralisation process  
 (C) Activated sludge process (D) Adsorption
183. Consider the following statements
- (A) The ratio of carbon to nitrogen in settled domestic sewer is always much higher than that of industrial wastes  
 (R) Because they contribute much organic matter.  
 select the correct answer according to the coding scheme given below
- (A) (A) is true but (R) is false  
 (B) (A) is false but (R) is true  
 (C) Both (A) and (R) are correct and (R) is not the correct explanation for (A)  
 (D) Both (A) and (R) are false and (R) is the correct explanation for (A)
184. Rice processing industry waste contains a high level of
- (A) Proteins (B) Amino acids  
 (C) Starch (D) Alkali metals
185. Choose the correct answer
- Normal human body has about \_\_\_\_\_ mg of silver, excess of Ag \_\_\_\_\_ mg in human body causes changes in blood cells, fall in blood pressure etc
- (A) 1, 100 (B) 5, 2500 (C) 10, 150 (D) 5, 150
186. Which among the following is correct.
- Permissible limits of radio active nuclides in water as recommended by the international commission on Radiological protection
- (A) 10 PC<sub>1</sub>/l -  $\alpha$  - activity (B) 8 PC<sub>1</sub>/l -  $\beta$  -activity  
 (C) 5 PC<sub>1</sub>/l - Radium 226 (D) 5 PC<sub>1</sub>/l -  $\alpha$  - activity
187. Assertion : (A) Flooding may not destroy the nature of the soil.  
 Reason : (R) Flooding of rivers and seas is not major routes of soil pollution  
 select your answer according to the coding scheme given below
- (A) (A) is false but (R) true and (A) is the correct explanation for (R)  
 (B) (A) is true but (R) is false and (R) is the correct reason for (A)  
 (C) Both (A) and (R) are false  
 (D) Both (A) and (R) are true

188. For the nuclear fusion reaction to take place
- (A) High temperature of the order of  $10^8$  K is required
  - (B) High pressure of the order of 100 atm is required
  - (C) High electric field of the order of  $10^8$  V/m is required
  - (D) High voltage of the order of  $10^4$  V is required
189. The coordination number for face centered cubic lattice is
- (A) 12
  - (B) 8
  - (C) 6
  - (D) 4
190. Super conductors are used to make
- (A) Permanent magnets
  - (B) Electronic devices
  - (C) Diodes
  - (D) Electro magnets
191. Polar dielectric materials which have permanent dipole moments are used in making
- (A) Capacitors
  - (B) Resistors
  - (C) Inductors
  - (D) PN junction diode
192. In semi conductors, the forbidden band is
- (A) Very small
  - (B) Very large
  - (C) Zero
  - (D) Overlap each other
193. The overall enterprise objective is achieved through
- (A) Organisation
  - (B) Staffing
  - (C) Co-ordinating
  - (D) Leadership
194. When the frequency of the voltage applied across a capacitor is increased
- (A) Current remains unchanged
  - (B) Current increases
  - (C) Current decreases
  - (D) Voltage is maximum



195. Ultrasonic waves are the those waves which have
- (A) Frequencies less than 20 Hz
  - (B) Frequencies between 20 Hz and 20,000 Hz
  - (C) Frequencies much higher than 20,000 Hz
  - (D) Frequencies equal to the frequencies of visible light
196. Water has the density maximum at the temperature equal to
- (A)  $-4^{\circ}\text{C}$
  - (B)  $0^{\circ}\text{C}$
  - (C) 4 K
  - (D)  $4^{\circ}\text{C}$
197. The first law of thermodynamics is a statement of
- (A) Conservation of universe
  - (B) Conservation of mass
  - (C) Conservation of momentum
  - (D) Conservation of energy
198. Assertion (A): For optical interference to take place monochromatic light is to be used  
Reason (R): The light source used should be coherent in nature
- (A) (A) is false and (R) is correct
  - (B) (A) is correct and (R) is false
  - (C) Both (A) and (R) are correct
  - (D) Both (A) and (R) are false
199. The condition for diffraction to take place is
- (A) The size of the obstacle should be less than intensity of light
  - (B) The size of the obstacle should be the comparable to the wavelength of light
  - (C) Both the sizes of the obstacle and the wavelength are not related
  - (D) The size of the obstacle should be greater than the size of the wavelength of light
200. The substance that rotate the plane of polarisation are said to be
- (A) Optically active
  - (B) Optically inactive
  - (C) Opaque
  - (D) Polaroids