

Sl. No. :

BOEP/19

Register
Number

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2019
BASICS OF ENGINEERING
(Degree Std.)

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 in series 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 Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number 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 Blue or Black ink 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 time of 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. **Do not make any marking in the question booklet except in the sheet before the last page of the question booklet, which can be used for rough work. This should be strictly adhered.**
11. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
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.

SPACE FOR ROUGH WORK

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1. The centre of gravity of a triangular lamina of base 'b' and height 'h' lies at a height of
- (A) $\frac{2}{3}h$ from the base. (B) $\frac{1}{4}h$ from the base.
- (C) $\frac{1}{2}h$ from the base. (D) $\frac{1}{3}h$ from the base.
2. The moment of inertia of a square lamina of side 30 cm about its edges is
- (A) $3.7 \times 10^5 \text{ cm}^4$ (B) $4.7 \times 10^5 \text{ cm}^4$
- (C) $1.7 \times 10^5 \text{ cm}^4$ (D) $2.7 \times 10^5 \text{ cm}^4$
3. A car is moving with velocity of 15 m/s. The car is brought to rest after application of brakes in 5 seconds. The retardation is
- (A) 10 m/s^2 (B) 5 m/s^2
- (C) 3 m/s^2 (D) 1 m/s^2
4. When the radial distance is 'r' the linear acceleration 'a' and angular acceleration ' α ' are related as follows
- (A) $a = r^2\alpha$ (B) $a = r^3\alpha$
- (C) $a = r\alpha$ (D) $a = r^4\alpha$
5. In transmission belts, the creep is due to
- (A) difference in belt tensions on two sides of pulley and the elasticity of belt material
- (B) plasticity of the belt material
- (C) elasticity of the belt material
- (D) density of the belt material
6. Which of the following is not a scalar quantity?
- (A) acceleration (B) time
- (C) volume (D) mass

7. The unit of work or energy in S.I. unit is
- (A) Newton (B) Pascal
 (C) Joule (D) Watt
8. The point at which the entire weight of an object by assumed to be acting is called
- (A) moment of inertia (B) centre of gravity
(C) centroid (D) line of action
9. A sinewave has a frequency of 50 Hz. Its angular frequency is _____ radian/seconds.
- (A) $50/\pi$ (B) $\frac{50}{2\pi}$
(C) 50π (D) 100π
10. The real power in an a.c. circuit is given by _____.
- (A) $VI \cos \phi$ (B) $VI \sin \phi$
(C) $I^2 z$ (D) VI
11. The braking Torque provided by a permanent magnet in a single phase energy meter is proportional to the
- (A) square of the flux of the permanent magnet and speed of the meter
(B) speed of the meter
(C) distance of the permanent magnet from the centre of the revolving disc
 (D) Both (A) and (C)

12. Mechanical losses in a dc machine consisting of
- (A) Hysteresis and eddy current loss (B) Friction and Windage loss
(C) Friction and eddy loss (D) Armature copper loss
13. The value of back emf in a dc motor is maximum at
- (A) full load (B) half full load
 (C) no load (D) $\frac{3}{4}$ th of full load
14. For higher efficiency of 3 phase induction motor. The slip should be _____.
- (A) large (B) very large
 (C) as small as possible (D) 1
15. In the breakdown region, zener diode behaves like a _____ source.
- (A) Constant voltage (B) Constant current
(C) Constant resistance (D) Constant power
16. The element that has the biggest size in a transistor is _____.
- (A) Collector (B) Base
(C) Emitter (D) pn junction
17. The phase difference between the input and output voltages of a transistor connected in common emitter arrangement is _____.
- (A) 0° (B) 180°
(C) 90° (D) 270°

18. If I were your teacher, I would have taught you good manners. This means that,

(A) I am your teacher

(B) I am not your teacher

(C) I will be your teacher

(D) I was your teacher

19. She fell _____ the thorns.

(A) on

(B) among

(C) between

(D) at

20. Choose the most appropriate alternative to correct the sentence.

Teacher praised student.

(A) Teacher praised the student

(B) The teacher praised the student

(C) The teacher praised student

(D) A teacher praised student

21. Choose the appropriate article

_____ young are always in a hurry.

(A) The

(B) A

(C) An

(D) Any

22. Sheela refused _____ his request.

(A) accede

(B) accede to

(C) to accede to

(D) from acceding to

23. Read the passage and choose the best answer for the question:

"The little boy, born to cricket, who once fashioned a crude pitch with a mattock out of the side of a hill in the tiny hamlet of Lisarow, had gone on to play forty four times for Australia". Whom do you think the passage refers to?

- (A) A cricketer (B) A traveller
(C) A peasant (D) A voyager

24. Choose the correct meaning of the following from the list

"The fish in troubled waters".

- (A) to aggravate the situation (B) to make the most in a bad situation
(C) to catch fish in the disturbed water (D) to indulge in evil conspiracies

25. Choose the correct meaning of the expression

"Turn over a new leaf".

- (A) hopeful situation (B) change for the better
(C) expression of anger (D) act foolishly

26. Choose from the alternatives the word which is nearly opposite in meaning to the underlined word.

No one can claim to be Omniscient however knowledgeable he or she may be

- (A) learned (B) ignorant
(C) educated (D) illiterate

27. Choose the word which is opposite in meaning to the underlined word.

It is onerous task to find an honourable solution to the problem of parking in the society.

- (A) exacting (B) formidable
 (C) light (D) useless

33. If $x = r \cos \theta$, $y = r \sin \theta$ then $\frac{\partial \theta}{\partial y}$ is

(A) $\frac{x}{x^2 + y^2}$

(B) $\frac{y}{x^2 + y^2}$

(C) $\frac{-y}{x^2 + y^2}$

(D) $r \cos \theta$

34. If $x + y + z = u$, $y + z = uv$, $z = uvw$, then find $\frac{\partial(x, y, z)}{\partial(u, v, w)}$.

(A) uv^2

(B) uv

(C) u^2v

(D) $2uv$

35. If (a, b) is a saddle point of the function $f(x, y)$, then at (a, b) , $\left(\frac{\partial^2 f}{\partial x^2}\right)\left(\frac{\partial^2 f}{\partial y^2}\right) - \frac{\partial^2 f}{\partial x \partial y}$ is

(A) 0

(B) > 0

(C) < 0

(D) may be complex number

36. $\int \log x dx$ is

(A) $x \cdot \log x - x + c$

(B) $xe^x - e^x + c$

(C) $x \cdot \log x - \log x + c$

(D) $\frac{1}{x} + c$

37. Evaluate : $\int_C \sqrt{x^2 + y^2} \cdot dx$, where C is the path $y = -x$ from $(0, 0)$ to $(-1, 1)$.

(A) $\frac{1}{\sqrt{2}}$

(B) 1

(C) -1

(D) $-\frac{1}{\sqrt{2}}$

38. Identify which of the following function is not analytic?

- (A) z^3 (B) e^z
(C) $\sin z$ (D) \bar{z}

39. If $f(z)$ is an analytic function of z , then $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \log|f(z)|$ is equal to

- (A) 0 (B) $|f'(z)|^2$
(C) $\frac{1}{|f(z)|^2}$ (D) $|f''(z)|^2$

40. Consider the statements:

S_1 : Every bilinear transformation maps circles or straight lines into circle or straight lines.

S_2 : Every bilinear transformation can be expressed as the resultant of an even number of inversions.

Say True or False;

- (A) S_1 : True ; S_2 : True (B) S_1 : True ; S_2 : False
(C) S_1 : False ; S_2 : True (D) S_1 : False ; S_2 : False

41. Evaluate $\int_{-2}^{-2+i} (2+z)^2 dz$.

- (A) $i/3$ (B) $-i/3$
(C) $3i$ (D) $-3i$

42. Find the nature and value of singularity of the function $f(z) = \frac{i}{\cos z - \sin z}$.

- (A) $z = \frac{\pi}{2}$, simple pole (B) $z = \frac{\pi}{3}$, removable
(C) $z = \frac{\pi}{4}$, simple pole (D) $z = \frac{\pi}{6}$, essential

43. A car accelerates on a horizontal road due to the force exerted by
- (A) the engine of the car (B) the driver of the car
 (C) the earth (D) the road
44. A block of mass ' m ' is placed on a smooth inclined plane of inclination ' θ ' with the horizontal. The force exerted by the plane on the block has a magnitude
- (A) mg (B) $mg/\cos \theta$
 (C) $mg \cos \theta$ (D) $mg \tan \theta$
45. The sound level at a point is increased by 30 dB. By what factor is the pressure amplitude increased?
- (A) 32 (B) 22
 (C) 12 (D) 42
46. Which one from the following is a correct characteristic of ultrasonic wave?
- (A) Ultrasonics are sound waves of very long wavelength
 (B) Ultrasonics are sound waves of very high frequency
 (C) Ultrasonic waves move faster than sound waves
 (D) Ultrasonic waves move slower than sound waves
47. Sound waves with frequencies below 16 Hz are called as
- (A) audible waves (B) infrasonic waves
 (C) ultrasonic waves (D) hypersonic waves
48. The Young's modulus of Aluminium is _____.
- (A) $0.9 \times 10^{11} \text{ N/m}^2$ (B) $0.70 \times 10^{11} \text{ N/m}^2$
 (C) $1.1 \times 10^{11} \text{ N/m}^2$ (D) $1.9 \times 10^{11} \text{ N/m}^2$

49. In an optical fibre the refractive index of the core is 1.6 and the cladding is 1.3. Calculate the critical angle.

- (A) $45^{\circ}30'$ (B) $30^{\circ}45'$
 (C) $54^{\circ}03'$ (D) $03^{\circ}54'$

50. In an optical fibre, the angle of incidence at which the angle of refraction is 90° is called as _____

- (A) Total internal Reflection (B) Critical Angle
(C) Reflection (D) Acceptance angle

51. The relation between energy and wavelength of a photon is expressed as _____

- (A) $E = \frac{hc}{\lambda}$ (B) $E = \frac{h}{p}$
(C) $E = \frac{h}{\lambda}$ (D) $E = mc^2$

52. The minimum energy required to pull a free electron on the surface of the metal is called as _____

- (A) Kinetic Energy (B) Work function
(C) Threshold frequency (D) Binding Energy

53. If an electron can be stopped by a potential of 20 volt its kinetic energy is

- (A) 20 eV (B) 20 volt
(C) 20 Calorie (D) 20 Joule

54. Heavy radioactive element eventually turn into

- (A) Radium (B) Lead
(C) Hydrogen (D) Barium

55. Good electric conductors at room temperature

- (A) are also super conductors below T_C
- (B) are not good conductors of electricity below T_C
- (C) are good super conductors above T_C
- (D) may behave as superconductors below T_C

56. If a wave travels an extra distance Δx with respect to the other wave, The phase difference is _____

- (A) $\delta = \frac{2\pi}{\lambda} \Delta x$
- (B) $\delta = \frac{\lambda}{2\pi} \Delta x$
- (C) $\delta = \left(\frac{2\pi}{\lambda}\right)^2 \Delta x^2$
- (D) $\delta = \frac{2\pi}{\Delta x} \cdot \lambda^2$

57. Arrange Wood, peat, lignite, bituminous coal and anthracite in decreasing order of calorific value

- (A) Bituminous < Anthracite < lignite < wood < peat
- (B) Anthracite < bituminous < lignite < peat < wood
- (C) Lignite < wood < peat < Bituminous < Anthracite
- (D) Peat < wood < lignite < Bituminous < Anthracite

58. Low speed diesel engine requires cetane number of

- (A) >5
- (B) >25
- (C) >15
- (D) >20

59. Sterilisation of water can be done by using

- (A) Oxygen
- (B) Ozone
- (C) Caustic potash
- (D) Hydrogen peroxide

60. Absorption of oxygen type corrosion occurs in
- (A) Neutral aqueous solution (B) Acidic aqueous solution
(C) Basic aqueous solution (D) Both in (A) and (B)
61. The process of zinc coating over iron sheets by hot – dipping is called :
- (A) Galvanization (B) Tinning
(C) Sheradizing (D) Anodizing
62. Concentration cell is used to determine
- (i) Solubility of sparingly soluble salts
(ii) Valency of ion
(iii) Oxidation potential
(iv) Reduction potential
- (A) Only (iv) is correct (B) (i) and (ii) is correct
(C) (iii) and (iv) is correct (D) Only (iii) is correct
63. The potential of the standard hydrogen electrode is
- (A) 1 volt (B) 0 (zero)
(C) 10 volts (D) 5 volts
64. Polarization depends on
- (i) Size and nature of electrode surface
(ii) Concentration of electrolyte
(iii) Conductivity of electrolyte
(iv) Brightening agents
- (A) Only (iii) is correct (B) Only (iv) is correct
(C) (i), (iii), (iv) is correct (D) (i), (ii), (iii) is correct

65. Which among the following solution would have the highest electrical conductance?
(A) 1 N NaCl (B) 1 N KCl
(C) 1 N MgCl₂ (D) 1 N CaCl₂
66. An Input Device that is used widely in super markets is
(A) Bar Code Reader (B) Key board
(C) Mouse (D) Joystick
67. Which keys are used by applications and operating systems to perform specific commands?
(A) Typing keys (B) Arrow keys
(C) Function keys (D) Control keys
68. A scanner with 3,400 elements scanning an 8.5 inch wide sheet has an optical resolution of
(A) 600 dots per inch (B) 400 dots per inch
(C) 800 dots per inch (D) 200 dots per inch
69. The time taken to initiate a data transfer from disk is called
(A) Disk seek time
(B) Disk latency Time
(C) Disk Rotational Delay Time
(D) Disk Transfer Time
70. Post is performed by the
(A) Compiler (B) Assembler
(C) BIOS (D) Linker

71. RPC in networks means
- (A) Remote Procedure Call
 - (B) Request Procedure Call
 - (C) Request Program Call
 - (D) Remote Program Call
72. _____ is the expansion of NIC and LANs.
- (A) Network Interface Card
 - (B) Network Interior Card
 - (C) Networking Interface Cable
 - (D) Network Interior Cable
73. CSMA stands for
- (A) Control Sense Multiple Access
 - (B) Computer Sense Multiple Access
 - (C) Carrier Sense Multiple Access
 - (D) Card Sense Multiple Access
74. The shortcut used for checking the spelling in document is
- (A) F7
 - (B) F5
 - (C) F3
 - (D) F2
75. JPEG stands for
- (A) Joint Picture Experts Group
 - (B) Joint Pixel Experts Group
 - (C) Joint Photo Experts Group
 - (D) Joint Publishing Experts Group
76. The two types of audio and video broadcasts are
- (A) Forward and backward
 - (B) Live and on-demand
 - (C) High speed and low speed
 - (D) Large and small size
77. A browser is used to
- (A) Copy documents
 - (B) Navigate the web
 - (C) Print documents
 - (D) Add documents

78. What is the name given to a detailed study of a job?
 (A) Job specification (B) Job rotation
 (C) Job analysis (D) Job description
79. In which model it is stated that the quality level increases when the cost of conformance increases?
 (A) Joseph Juran (B) Philip Crosby
 (C) Masaaki Imai (D) Edward Deming
80. _____ involves complete delegation of authority so that subordinates themselves take decisions.
 (A) Participative Leadership (B) Laissez – Faire Leadership
 (C) Autocratic Leadership (D) None of the above
81. The control chart used for the fraction of defective items in a sample is _____
 (A) Range chart (B) P – chart
 (C) Mean chart (D) C – chart
82. Management by objectives is the contribution of
 (A) Max Webber (B) Douglas McGregor
 (C) Graicuna (D) Peter. F. Drucker
83. The practice Seiso is related to
 (A) Standardise all practices (B) Keep environment clean
 (C) Make cleaning a routine practice (D) Arrange thing in order
84. Which type of process is recruitment?
 (A) Positive process (B) Neutral process
 (C) Negative process (D) Short and Systematic process

85. In which type of organisation the concept of unity of command does not apply?
- (A) Military type of organisation (B) Functional type of organisation
(C) Line and Staff organisation (D) Matrix organisation
86. Who developed quality function deployment?
- (A) Yosi Akao (B) Joseph M. Juran
(C) Philip Crosby (D) Masaaki Imai
87. Which type of communication exists between peers or colleagues?
- (A) Horizontal communication (B) Upward communication
(C) Downward communication (D) Diagonal communication
88. Who propounded fishbone diagram?
- (A) Armand V. Feigenbaum (B) Deming W. Edwards
(C) Joseph M. Juran (D) Kaon Ishikawa
89. Those activities involved in introducing the new employees to the organisation and its policies, procedures, rules and regulations is called as
- (A) Placement (B) Induction
(C) Selection (D) Recruitment
90. The concept of "Gang – plank" was given by
- (A) F.W. Taylor (B) Henry Fayol
(C) Elton Mayo (D) Peter F. Drucker
91. Most hazardous metal pollutant of automobile exhaust is
- (A) Cd (B) Hg
 (C) Pb (D) Cu

98. The unit of power in SI system is

(A) Pascal

(B) Joule

(C) Watt

(D) Horse power

99. The forces whose lines of action lie in the same plane and are meeting at one point are known as

(A) Coplanar non concurrent forces

(B) Non coplanar concurrent forces

(C) Non coplanar non concurrent forces

(D) Coplanar concurrent forces

100. Two forces of magnitude 4 N and 5 N act at an angle of 60° at a point. The resultant force is

(A) $\sqrt{61}$ N

(B) $\sqrt{48}$ N

(C) $\sqrt{31}$ N

(D) 8 N

101. A force $F = 2i + 4j - 3k$ is applied at a point $P(1, 1, -2)$. The moment of the force about point $Q(2, -1, 2)$ is

(A) $11i - 10j - 16k$

(B) $10i - 11j - 8k$

(C) $8i - 11j - 10k$

(D) $16i - 11j - 8k$

102. The co-efficient of friction (μ) in terms of the angle of friction (ϕ) is expressed as follows

(A) $\phi = \tan \mu$

(B) $\mu = \sin \phi$

(C) $\mu = \tan \phi$

(D) $\mu = \frac{1}{\tan \phi}$

103. The maximum efficiency of screw Jack for raising a load 'w' is _____ where α = helix angle and ϕ = angle of friction.

(A) $\left[\frac{1 - \tan \phi}{1 + \tan \phi} \right]$

(B) $\left[\frac{\sin \phi}{1 + \cos \phi} \right]$

(C) $\left[\frac{\cos \phi}{1 + \sin \phi} \right]$

(D) $\left[\frac{1 - \sin \phi}{1 + \sin \phi} \right]$

104. A boat of mass 5000 kg initially at rest is pulled by a force of 30 kN through a distance of 4 m. Assuming that the resistance due to water is negligible, the velocity of the boat is
- (A) 5.20 m/s (B) 6.93 m/s
 (C) 4.82 m/s (D) 6.10 m/s
105. Particle moving on a straight line is termed as
- (A) curvilinear motion (B) rectilinear motion
 (C) absolute motion (D) relative motion
106. Which of the following is not the unit of pressure?
- (A) kg/cm² (B) ata
 (C) bar (D) Newton
107. Moment of inertia of an area will be least w.r.t.
- (A) horizontal axis (B) central axis
 (C) vertical axis (D) point of suspension
108. When a body slides down in an inclined surface, the acceleration of the body is given by
- (A) $g \cos \theta$ (B) $g \frac{1}{\sin \theta}$
 (C) $g \sin \theta$ (D) $g \tan \theta$
109. A body dropped from a height 'H' reaches the ground after 't' seconds. It would have reached a height of 0.5 H at a time
- (A) 0.707 t seconds (B) 0.67 t seconds
 (C) 0.2 t seconds (D) 0.15 t seconds

110. The power in a 3 phase circuit is measured with the help of 2 watt meters. The readings of one of watt meters is positive and that of other is negative. The magnitude of readings is different. It can be concluded that the power factor of the circuit is

- (A) unity
- (B) zero (lagging)
- (C) 0.5 (lagging)
- (D) less than 0.5 (lagging)

111. In a network made up of linear resistors and ideal voltage sources, values of all resistors are doubled. Then voltage across each resistor is

- (A) doubled
- (B) halved
- (C) decreased four times
- (D) not changed

112. Telegraph signal is a/an _____ signal.

- (A) Digital
- (B) Analog
- (C) Pulse train
- (D) Impulse

113. Automatic gain control is used in radio receiver to _____.

- (A) maintain the carrier level to the detector input constant.
- (B) improve selectivity
- (C) improve signal to noise of the receiver
- (D) reduce gain

114. Contrast control is located in _____ stage of a TV receiver

- (A) tuner
- (B) video detector
- (C) video amplifier
- (D) synchronizing separator

115. Convert the decimal number 113.5 into binary.
- (A) 1110011.0 (B) 1110101.1
 (C) 1110001.1 (D) 1110111.1
116. The complete set of only those logic gates designated as universal gates is _____.
- (A) NOR, OR and AND gates (B) XNOR, NOR, NAND gates
 (C) NOR and NAND gates (D) XOR, NOR and NAND gates
117. Biomedical waste may be disposed of by
- (A) Incineration (B) Auto claving
 (C) Land filling (D) Both (B) and (C)
118. A latch is used to store 1 _____ of data.
- (A) bit (B) byte
(C) kilobyte (D) megabyte
119. The maximum sampling time (T_s) of a 10 kHz sinusoidal voltage for conversion to digital form is _____.
- (A) 0.01 ms (B) 0.05 ms
(C) 0.1 ms (D) 0.02 ms
120. The iron core is used to _____ of the transformer
- (A) increase the weight (B) provide tight magnetic coupling
(C) reduce core losses (D) provide mechanical strength

121. The Librarian asked the children _____ so much noise in the library.
- (A) don't make (B) not make
 (C) not to make (D) not making
122. Though the terrorists outnumbered the army unit, the brave captain refused to _____.
- (A) give way (B) give in
(C) give out (D) give over
123. _____ helped me, I would have failed.
- (A) If he did not (B) Had he not
(C) Have not he (D) He has not
124. The Inspector of Excise has to conduct regular checks and _____ to visit the unit at least once a day.
- (A) requires (B) required
 (C) is requiring (D) is required
125. Choose the best one word substitute for "that which can live on land and water"
- (A) amphibious (B) abstemious
(C) aquatic (D) acquarian
126. Choose the best one word substitute for "One who is retired from service but retaining on honorary title".
- (A) meritorious (B) impecunious
 (C) emeritus (D) emancipated

127. Choose the best synonym of the underlined word.

Maintaining law and order in cosmopolitan cities is an arduous task for the police.

- (A) difficult (B) impossible
(C) delicate (D) easy

128. Choose the best word which expresses the meaning of the underlined word.

Sardar Patel is known as an iron-man of India. Even the news of his wife's death did not disturb his equinity.

- (A) composure (B) mood
(C) temper (D) attitude

129. Choose the most appropriate alternative.

Our teachers expect _____ to them.

- (A) that we should be respectful (B) that we respect to them
 (C) us to be respectful (D) we respect them

130. Choose the most appropriate alternative to fill in the blank.

_____ I carry that box for you?

- (A) Do (B) Will
 (C) Shall (D) Can

131. _____ book on that shelf is _____ interesting one about _____ history of Hindus.

- (A) a, an, the (B) the, a, an
 (C) the, an, the (D) a, an, an

132. The eigen values of a real symmetric matrix are
- (A) all zero (B) all real
 (C) purely imaginary (D) both real and imaginary
133. Two matrices A and B are said to be similar if there exists a non-singular matrix P such that
- (A) $P = B^{-1}AB$ (B) $B = P^{-1}AP$
 (C) $A \neq P^{-1}BP$ (D) $P \neq B^{-1}AB$
134. Inverse of an orthogonal matrix is
- (A) a null matrix (B) an identity matrix
 (C) an orthogonal matrix (D) an unitary matrix
135. Which one of the following ordinary differential equation is Legendre's linear equation?
- (A) $y'' + xy' - y = x^2$ (B) $\frac{1}{x^2}y'' - \frac{4}{x}y' + 3y = \log x$
 (C) $x^2y'' - 3xy' + 4y = (1+x)^2$ (D) $(2x+3)^2y'' - (2x+3)y' - 12y = 6x$
136. Solve $(x^2 - y^2)dx + 2xydy = 0$
- (A) $x^2 - y^2 = Cx$ (B) $x^2 - y^2 = C$
 (C) $x^2 + y^2 = Cx$ (D) $x^2 + y^2 = C$
137. Find the particular integral (P.I.) of $[(D+2)(D-1)^2]y = 2\sinh x$, where $D \equiv \frac{d}{dx}$
- (A) $P.I = \frac{x^2}{6}e^{-x} + \frac{e^x}{4}$ (B) $P.I = \frac{x^2}{4}e^{-x} + \frac{e^x}{6}$
 (C) $P.I = \frac{x^2}{4}e^x + \frac{e^{-x}}{6}$ (D) $P.I = \frac{x^2}{6}e^x - \frac{e^{-x}}{4}$

138. $\int_0^1 \int_1^2 (x^2 + y^2) dy \cdot dx$ is

(A) $\frac{1}{3}$

(B) $\frac{8}{3}$

(C) $\frac{5}{3}$

(D) 3

139. The maximum directional derivative of $\phi = xyz^2$ at $(1, 0, 3)$ is along.

(A) x - axis

(B) y -axis

(C) z - axis

(D) $\vec{i} + \vec{j} + \vec{k}$

140. Find 'a' so that the vector $\vec{A} = (ax^2 - y^2 + x)\vec{i} - (2xy + y)\vec{j}$ is irrotational.

(A) 4 only

(B) -2 only

(C) 2 only

(D) for all values of 'a'

141. If $\vec{r} = (t+1)\vec{i} + (t^2+t+1)\vec{j} + (t^3+t^2+t+1)\vec{k}$ then find the velocity at $t = 0$.

(A) $\vec{i} + 2\vec{j} + 3\vec{k}$

(B) $\vec{i} + \vec{j} + \vec{k}$

(C) $t\vec{i} + 2t\vec{j}$

(D) $\vec{0}$

142. If S is the surface of a sphere of radius 'a' then $\iint_S (x dy dz + y dz dx + z dx dy)$ is

(A) $4\pi a^2$

(B) $\frac{4}{3}\pi a^3$

(C) $4\pi a^3$

(D) $\frac{4}{3}\pi a^2$

143. The power series $z(1-z) + z^2(1-z) + z^3(1-z) + \dots \infty$ converges only if

(A) $|z| < 1$

(B) $|z| > 1$

(C) $|z| = 1$

(D) $|z-1| < 0$

144. Which one of the following function is of exponential order?

(A) t^2

(B) $\sec t$

(C) $\tan t$

(D) $(10)^t$

145. Find $L\left(\frac{1}{\sqrt{t}}\right)$

(A) $\sqrt{\frac{\pi}{s}}$

(B) $\sqrt{\frac{s}{\pi}}$

(C) $\frac{1}{\sqrt{s}}$

(D) $\frac{1}{\sqrt{\pi}}$

146. $L^{-1}\left(\tan^{-1}\frac{1}{s}\right) =$

(A) $\frac{\sin t}{t}$

(B) $\frac{\cos t}{t}$

(C) $\frac{t}{\sin t}$

(D) $\frac{t}{\cos t}$

147. Two particles of masses 1.0 kg and 2.0 kg are placed at a separation of 50 cm. Find the force of gravitation exerted by one on the another. (Given $G : 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$)

(A) $5.3 \times 10^{-10} \text{ N}$

(B) $3.5 \times 10^{-10} \text{ N}$

(C) $5.0 \times 10^{-10} \text{ N}$

(D) $6.3 \times 10^{-10} \text{ N}$

148. The device which converts heat into mechanical work is _____.
- (A) Motor (B) Generator
 (C) Heat engine (D) Energy Converter
149. Ultrasonic waves are
- (A) Electromagnetic waves of large wavelength
(B) Electromagnetic waves of high frequency
(C) Sound waves of very large wavelength
 (D) Sound waves of very high frequency
150. A rotating calcite crystal is placed over an ink dot. On seeing through the crystal, one finds
- (A) two stationary dots
(B) two dots moving along straight lines
 (C) one dot rotating about the other
(D) both dots rotating about a common axis
151. If i_m be the maximum angle of incidence for which total internal reflection occurs, then $\sin i_m$ is known as
- (A) acceptance angle
(B) measure of the efficiency of optical power
(C) the value of the difference of refractive index of core and cladding
 (D) numerical aperture
152. De - Broglie waves are associated with
- (A) moving neutral particles only
(B) moving charged particles only
 (C) all moving particles
(D) all particles whether in motion or rest

153. A young's double slit experiment is performed with white light
- (A) The central fringe be black
 - (B) There will be completely dark fringe
 - (C) The fringe next to the central will be red
 - (D) The fringe next to the central will be violet
154. An ion displaced from the lattice into an interstitial site is called a
- (A) Schottky defect
 - (B) Frenkel defect
 - (C) Electronic defect
 - (D) Line defect
155. The favourable condition for occurring Superconductivity
- (A) A weak electron – Phonon interaction
 - (B) A strong electron – Phonon interaction
 - (C) A weak phonon – Phonon interaction
 - (D) A strong electron – electron interaction through phonon
156. The magnetization of a solid is related to its magnetic induction B and the field strength H by the relation
- (A) $M = \left(\frac{B}{\mu_0} \right) - H$
 - (B) $B = \mu_0 H + M$
 - (C) $B = H + \mu_0 M$
 - (D) $B = \mu_0 [H - M]$
157. Clausius – mosotti relation in dielectrics is given by
- (A) $\frac{\sum r+1}{\sum r-2} = \frac{N\alpha}{3\sum_0}$
 - (B) $\frac{\sum r-1}{\sum r-2} = \frac{N\alpha}{3\sum_0}$
 - (C) $\frac{\sum r+1}{\sum r+2} = \frac{N\alpha}{3\sum_0}$
 - (D) $\frac{\sum r-1}{\sum r+2} = \frac{N\alpha}{3\sum_0}$

158. Water containing magnesium bicarbonate and calcium chloride is :
- (A) Permanent hard water only
 - (B) Temporary hard water only
 - (C) Both Temporary and Permanent hard water
 - (D) Soft water
159. Stereo specific polymers are obtained by using _____ polymerization.
- (A) Ziegler – Natta
 - (B) Free radical
 - (C) Cationic
 - (D) Anionic
160. Polymerisation in which two or more chemically different monomers combine to form a polymer without elimination is known as
- (A) Addition polymerization
 - (B) Co – polymerisation
 - (C) Condensation polymerization
 - (D) Homochain polymers
161. Phenol – formaldehyde resin is commercially known as
- (A) Teflon
 - (B) Bakelite
 - (C) Dacron
 - (D) Styrene
162. The water absorption tendency of vulcanized Rubber _____, as the Sulphur percentage content increases.
- (A) Increases rapidly
 - (B) Decreases
 - (C) Remains constant
 - (D) Increases two times
163. Rusting of iron in saline water is
- (A) Slow
 - (B) Very slow
 - (C) Fast
 - (D) No corrosion

164. The Net reaction for methanol – oxygen fuel cell is

- (A) $\text{CH}_3\text{OH} + \frac{2}{5}\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ (B) $\text{CH}_3\text{OH} + \frac{3}{4}\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 (C) $\text{CH}_3\text{OH} + \frac{3}{2}\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ (D) $\text{CH}_3\text{OH} + \frac{1}{2}\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

165. Initial flash set of cement is caused by the

- (A) Hydration of Tricalcium Aluminate
(B) Presence of gypsum
(C) Gelation of Dicalcium Silicate
(D) Gelation of Tricalcium Silicate

166. Lime used for the manufacturing refractories is :

- (A) Hydraulic lime (B) Lean lime
 (C) Dolomitic lime (D) Gypsum

167. Major component of Portland Cement is

- (A) Tricalcium Silicate (B) CaO
(C) MgO (D) CaSO₄

168. High resistance to spalling is shown by

- (A) Magnesite refractory (B) Dolomite refractory
 (C) Alumina refractory (D) Lime refractory

175. Payment Transactions can be done using
- (A) E-earning (B) E-mail
 (C) E-commerce (D) E-government
176. Which of the following is not a procedural language?
- (A) LISP (B) Pascal
(C) C (D) FORTRAN
177. PERT and CPM are _____ control techniques.
- (A) Production (B) Inventory
(C) Manpower (D) Budgetary
178. EMS certification is against
- (A) ISO 14000 (B) ISO 14004
 (C) ISO 14001 (D) ISO 14050
179. Which does not fall under QS 9000?
- (A) Statistical process control (B) Measurement system analysis
 (C) Cause and Effect Analysis (D) Failure mode and Effect Analysis
180. Kaizen means
- (A) Continuous improvement (B) Enhancing process
(C) Reduce failure rates (D) Gradual maintenance
181. What is the type of maintenance named when the critical parts of the equipment are continuously monitored?
- (A) Routine (B) Preventive
 (C) Condition based (D) Predictive

182. How many major blocks are there in House of Quality?
(A) 5 (B) 6
(C) 4 (D) 8
183. Which diagram forms the basis of relationship diagram?
(A) Tree (B) Affinity
(C) Prioritisation (D) Arrow
184. The obligation to carry out delegated authority is known as
(A) Authority (B) Responsibility
(C) Departmentation (D) Decentralisation
185. Taguchi suggested that loss in a process is increased with the increase of
(A) Specifications (B) Standards
(C) Breakdowns (D) Variability
186. _____ determines the complexity of manager's job, the number of managers required and the shape of organisation.
(A) Unity of command (B) Span of management
(C) Unity of Direction (D) Delegation of authority
187. Which was the first company to adopt six sigma?
(A) Texas Instruments (B) Motorola
(C) General Electric (D) Kodak
188. Specify the major objective of TPM
(A) Quality Assurance (B) Quality management
(C) Preventive maintenance (D) Break down maintenance

189. What is the causative organism of Salmonellosis pathogen carried by the sewage?

- (A) Salmonella species (B) Escherichia coli
(C) Round worms (D) Flat worms

190. The by products of composting are

- (A) Organic Manure (B) Methane
(C) CO₂ (D) Both (A) and (B)

191. Match the following
Information

Comments

- | | |
|-----------------------------|--|
| (I) Accountabilities | (a) Who does the job holders report to directly (Line Manager) or on grounds of Functional authority. |
| (II) Organisational factors | (b) These are the results for which you are responsible. In practice they might be phrased in the same way as a description of a task. |
| (III) Environmental factors | (c) The task you are expected to do. If the purpose of the job is to ensure. |
| (IV) Content of the job | (d) Working conditions, security and safety issues equipment. |

- | | | | | |
|---|-----|------|-------|------|
| | (I) | (II) | (III) | (IV) |
| (A) | a | b | c | d |
| (B) | b | a | c | d |
| <input checked="" type="checkbox"/> (C) | b | a | d | c |
| (D) | d | c | b | a |

192. What is the BOD level in polluted water?

- (A) Above 30mg /L (B) Below 30 mg /L
(C) 5 mg /L (D) 10 mg /L

193. Which of the following is a major sources of thermal pollution in water bodies?

- (A) Treatment plants (B) Solid wastes
(C) Both (A) and (B) (D) Thermal power plants

194. The major pollutant in vehicle emission is

- (A) CO₂ (B) CO
(C) SO₂ (D) NO_x

195. Global significance of 'coral bleaching' occurred in
 (A) Great Barrier Reef (B) Gulf of Mannar
(C) Pacific ocean (D) Atlantic Ocean
196. Which of the following strategy is not useful for the global warming?
(A) Increase in forest cover (B) Limited use of fossil fuels
 (C) Increasing use of nitrogen fertilizers (D) Use of other options instead of CFCs
197. The origin of positive lapse rate, i.e. increase of temperature with increasing altitude occurred in
 (A) Stratosphere (B) Mesosphere
(C) Ionosphere (D) Troposphere
198. _____ is widely used as a blending oxygenate in petrol for cleaner burning of the fuel.
(A) BTX (B) MTBE
(C) TEL (D) CNG
199. IPCC stands for
 (A) Intergovernmental Panel on Climate Change
(B) International Panel on Climate Change
(C) International Panel on Climate Convention
(D) Intergovernmental Panel on Climate Convention
200. Montreal protocol was implemented in
(A) 1985 (B) 1995
 (C) 1987 (D) 1997

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