Question Booklet № 76533 Roll Number :

INSTRUCTIONS TO CANDIDATES

[Do not open this booklet unless you are asked to do so]

1. Fill in the OMR sheet carefully as per the instructions given on the back side of the OMR sheet.
2. Use only black/blue ball point pen to fill the OMR sheet.
3. Write your Roll Number (six digits) on the Question Booklet and on the left hand side of the OMR sheet (basic data part).
4. There are 120 Objective type multiple choice questions, which are to be answered in 120 minutes.
5. There are 4 options (A, B, C & D) for each question. Mark your answer corresponding to each question by darkening the corresponding bubble in the OMR sheet with a black/blue ball point pen. **For every correct answer 3 mark will be awarded and for every incorrect answer 1 mark will be deducted from the total marks scored. No deduction of mark will be made for unanswered questions.** Marking of more than one bubble against a question in the OMR sheet will be considered as an incorrect answer. Erasing, overwriting, partial marking etc. may also be treated as incorrect answer.
6. Candidates are not permitted to use Calculator, Logarithm table, Mobile phone or any other electronic equipment in the examination hall.
7. Please handover the Answer Sheet along with its duplicate copy to the invigilator and collect the duplicate copy from the invigilator before leaving the Examination Hall. Failure to comply this may lead to cancellation of your candidature. The Admit Card and Question Booklet can be retained by the candidates after the examination.
8. Any misconduct and attempt of malpractice may also lead to cancellation of your candidature.
9. Answer keys will be published in the website www.keralapsc.org on 31-5-2015 (Sunday) at 5 p.m. Complaints, if any, regarding the answer keys with DOCUMENTARY PROOF may sent to the Joint Controller, Office of the Controller of Technical Examinations, Kaimanam, Thiruvananthapuram-40 so as to reach this office on or before 5-6-2015, 4 p.m. Complaints not substantiated with supporting documents will not be considered and the decision of the experts shall be final.
10. Candidates are permitted to leave the examination hall only after the completion of examination time.

Answer questions 1-5 based on the given passage. Choose the best answer from the options given.

"I bring to your mind those early days, when nature produced huge monsters. Who in those days could dare to believe that they were doomed ? Then happened a miracle. All of a sudden, in the midst of that orgy, of highness and physical strength, appeared Man, without weapons and without protection, naked, small and tender of skin. He discovered the full power of his intellect and stood up against the might of muscle with weapons shaped by his mind, and he held his own and survived".

1. 'Then happened a miracle' what was the miracle that happened ?
   (A) Man appeared
   (B) Monsters appeared
   (C) Nature appeared
   (D) Weapons appeared

2. Man survived because of his .....
   (A) Weapons
   (B) Intellect
   (C) Skin
   (D) Muscle

3. In early days people dared to believe that .....
   (A) Monsters will be destroyed
   (B) Weapons will be invented
   (C) Man will appear
   (D) Nature will produce huge monsters

4. Pick out from the passage a word that means 'consign to destruction'.
   (A) Survive
   (B) Orgy
   (C) Doomed
   (D) Miracle

5. The antonym of the word 'tender' is .....
   (A) Soft
   (B) Tough
   (C) Smooth
   (D) Gentle

Choose the most suitable option to fill in the blanks

6. If I open the window, the wind .....

(A) will come (C) would have come

(B) would come (D) would have been come

Begin the sentence with the word 'I'

7. They gave me a pen.

(A) I gave a pen (C) I will be given a pen

(B) I was given a pen (D) I will give a pen

Identify the wrong section

8. The programme/was inaugurated/by/the principle.

(A) The programme (C) by

(B) was inaugurated (D) the principle

9. A person who knows or can speak many languages is .....

(A) Polygamy (C) Polysyllabic

(B) Polyglot (D) Polyphony

Complete the proverb

10. Birds of a feather .....

(A) Fly to south (C) fight with each other

(B) flock together (D) fill the cage

11. Which of the following value of λ gives infinite number of solutions to the system ?

$x + y + z = 6$

$x + 2y + 3z = 10$

$x + 2y + \lambda z = 10$

(A) $\lambda = -3$ (C) $\lambda = 3$

(B) $\lambda = 0$ (D) $\lambda = 1$

12. If $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ then A^8 equals

(A) $\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ (C) $\begin{bmatrix} 256 & 0 \\ 0 & -256 \end{bmatrix}$

(B) $\begin{bmatrix} 8 & 16 \\ 16 & -8 \end{bmatrix}$ (D) $\begin{bmatrix} 625 & 0 \\ 0 & 625 \end{bmatrix}$

13. Choose the correct pair of values of sum and product of eigen values of the matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$

(A) 5 & 7 (C) 7 & 3

(B) 7 & 5 (D) 5 & 3

14. Which of the following set of vectors are linearly dependent.

(A) {(1, 2, 3), (0, 0, 1), (1, 0, 0)} (C) {(0, 0, 1), (0, 1, 1), (1, 1, 1)}

(B) {(0, 1, 2), (–1, 1, 2), (2, 1, 0)} (D) {(1, 2, 1), (2, –1, 1), (3, 1, 2)}

15. If $\begin{bmatrix} 5 & 4 \\ 1 & 1 \end{bmatrix} X = \begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$ then X equals

(A) $\begin{bmatrix} -3 & -14 \\ 4 & 17 \end{bmatrix}$ (C) $\begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & -2 \\ 3 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 3 & 14 \\ 4 & 17 \end{bmatrix}$

16. If $u = x^y$, then $\frac{\partial u}{\partial y} = ?$

(A) $y^x \log x$ (C) yx^{y-1}

(B) $x^y \log x$ (D) xy^{x-1}

17. If $y = e^{a \sin^{-1} x}$ which of the following is correct.

(A) $(1 - x^2) y_{n+2} + (2n + 1) y_{n+1} - (n^2 + a^2) y_n = 0$

(B) $(1 + x^2) y_{n+2} - (2n - 1) y_{n+1} - (n^2 + a^2) y_n = 0$

(C) $(1 - x^2) y_{n+2} - (2n - 1) x y_{n+1} - (n^2 + a^2) y_n = 0$

(D) $(1 - x^2) y_{n+2} - (2n + 1) x y_{n+1} - (n^2 + a^2) y_n = 0$

18. $\lim_{\theta \to 0} \frac{1 - \cos\theta}{\sin^2 \theta} = ?$

(A) $\frac{-1}{2}$ (C) 0

(B) $\frac{1}{2}$ (D) ∞

19. Radius of curvature at (0, 2) on the circle $x^2 + y^2 = 4$ is

(A) 4 (C) 1

(B) 2 (D) did not exist

20. A rectangular box open at the top is to have volume 32 cubic feet. What is the minimum surface area of material required for its construction ?

(A) 24 sq. ft. (C) 32 sq. ft.

(B) 56 sq. ft. (D) 48 sq. ft.

21. For a positive term series $\sum U_n$, if $\lim_{n\to\infty} \frac{U_{n+1}}{U_n} = \frac{1}{2}$, which of the following is correct.

(A) $\sum U_n$ converges (C) did not predict its convergence

(B) $\sum U_n$ diverges (D) $\sum U_n$ oscillates

22. Sum of the alternating harmonic series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots\cdots$ is

(A) 0 (C) log 2

(B) ∞ (D) does not exist

23. Which of the following is correct for the series $\frac{1}{2\sqrt{1}} + \frac{x^2}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \frac{x^6}{5\sqrt{4}} + \cdots\cdots\infty$

(A) Converges when $x^2 < 1$ (C) Converges for all x

(B) Diverges for all x (D) Converges when $x^2 > 1$

24. Which of the following is a converging series ?

(A) $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots\cdots\infty$ (C) $1 + \frac{1}{2^1} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \frac{1}{2^5} + \cdots\cdots\infty$

(B) $1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \cdots\cdots\infty$ (D) $1 - 1 + 1 - 1 + 1 - 1 + \cdots\cdots\infty$

25. What is the sum of the series $0.1 + 0.01 + 0.001 + 0.0001 + 0.00001 + \cdots\cdots\infty$

(A) ∞ (C) 2

(B) 1 (D) $\frac{1}{9}$

26. If $f(x) = -f(-x)$ and $f(x)$ satisfy the Dirichlet conditions then $f(x)$ can be expanded in a Fourier series containing.

(A) Only sine terms (C) Cosine terms and a constant term

(B) Only cosine terms (D) Sine terms and a constant term

27. Which of the following function is not periodic ?

(A) $5\cos 5\theta$ (C) $e^{i8\pi\theta}$

(B) $\sin\theta + \cos\theta$ (D) $e^{3\theta}\cos 3\theta$

28. Which of the following is the Fourier series representation of $x - x^2$ in $(-\pi, \pi)$

(A) $-\frac{\pi^2}{3} + \sum_{n=1}^{\infty} \frac{4}{n^2}(-1)^{n+1} \cos nx + \sum_{n=1}^{\infty} \frac{2(-1)^{n+1}}{n} \sin nx$

(B) $\frac{\pi^2}{3} + \sum_{n=1}^{\infty} \frac{4}{n^2}(-1)^{n+1} \cos nx + \sum_{n=1}^{\infty} \frac{2(-1)^{n+1}}{n} \sin nx$

(C) $-\frac{\pi^2}{3} - \sum_{n=1}^{\infty} \frac{4}{n^2}(-1)^{n+1} \cos nx + \sum_{n=1}^{\infty} \frac{2(-1)^{n+1}}{n} \sin nx$

(D) $\frac{\pi^2}{3} + \sum_{n=1}^{\infty} \frac{4}{n^2}(-1)^{n+1} \cos nx - \sum_{n=1}^{\infty} \frac{2(-1)^{n+1}}{n} \sin nx$

29. The Laplace transform of $t\sin at$

(A) $\frac{2as}{(s^2 - a^2)^2}$ (C) $\frac{2as}{(s^2 + a^2)}$

(B) $\frac{a + s}{(s^2 + a^2)}$ (D) $\frac{2as}{(s^2 + a^2)^2}$

30. The Inverse Laplace transform of $\frac{2s + 2}{s^2 + 2s + 10}$

(A) $2e^{-t}\sin 3t$ (C) $2e^{t}\cos 3t$

(B) $2e^{-t}\cos 3t$ (D) $e^{-t}\sin 3t$

31. An Invar tape is made of an alloy of

(A) Copper and steel (C) Brass and steel

(B) Brass and nickel (D) Nickel and steel

32. In the cement the compound quickest to react with water, is

(A) Tricalcium aluminate (C) Tricalcium silicate

(B) Tetra-calcium alumino-ferrite (D) Dicalcium silicate

33. Which is the test related to workability ?

(A) Soundness test (C) Vee Bee Consistometer test

(B) Proctor compaction test (D) Plate load test

34. Seasoning is

(A) A process of removing moisture (C) Painting with sodium silicate

(B) Creosoting (D) Coating with tar

35. In which type of bond, headers and stretchers placed alternatively in each course ?

(A) English bond (C) Header bond

(B) Stretcher bond (D) Flemish bond

36. Which one of the following type of foundation is used for black cotton soils ?

(A) Under reamed piles (C) Grillage foundation

(B) Inverted arch footing (D) Sand piles

37. An imaginary vertical line which includes the vertical joint separating two adjoining bricks is known as

(A) Lap (C) Bat

(B) Perpend (D) Closer

38. The commonly used drying oil for oil paints, is

(A) Olive oil (C) Kerosine oil

(B) Linseed oil (D) Coconut oil

39. The member which is placed horizontally to support common rafter of a sloping roof, is

(A) Purlin (C) Batten

(B) Cleat (D) Strut

40. For constructing a terrazo floor, pick up the incorrect statement from the following

(A) A base course is prepared as in cement concrete flooring.

(B) A 32mm thick layer of cement concrete (1:2:4) is laid on the base course and the surface is made smooth by trowelling.

(C) Glass strips are driven into the layer according to the pattern required.

(D) After final grinding is over, oxalic acid mixed with water is spread over and rubbed hard with soft material.

41. You are asked to design and supervise a truss for a factory to have spans 6m to 9m. The type of the truss you use is

(A) Mansored truss (C) King post truss

(B) Scissors truss (D) Collar truss

42. In chain surveying tie lines are primarily provided
    (A) To check the accuracy of the survey
    (B) To take offsets for detail survey
    (C) To increase accuracy of work
    (D) To increase the number of chain lines.

43. In quadrantal bearing system, back bearing of a line may be obtained from its forward bearing, by
    (A) Adding 180°, if the given bearing is less than 180°
    (B) Subtracting 180°, if the given bearing is more than 180°
    (C) Changing the cardinal points, i.e. substituting N for S and E for W and vice-versa
    (D) Same as given bearing

44. The bearings of the lines AB and BC are 146° 30′ and 68° 30′ . The included angle ABC is
    (A) 102° (C) 45°
    (B) 78° (D) 302°

45. The main principle of surveying is to work
    (A) From part to the whole (C) From higher level to the lower level
    (B) From whole to the part (D) From lower level to higher level

46. Temperature of an ideal gas during throttling expansion
    (A) Decreases (C) Remain the same
    (B) Increases (D) Decreases/increases depending on initial conditions

47. During polytropic expansion of a gas, work obtained is maximum when expansion index 'n' is
    (A) 1.4 (C) 0.5
    (B) 1 (D) ∞

48. Reversible adiabatic process is also called
    (A) Isentropic process (C) Throttling process
    (B) Isenthalpic process (D) Polytropic process

49. Compression ratio of an Internal combustion engine is defined as
    (A) Swept volume/clearance volume (C) Swept volume/total volume
    (B) Total volume/clearance volume (D) Clearance volume/total volume

50. For the same compression ratio
    (A) Otto cycle is more efficient than diesel cycle
    (B) Diesel cycle is more efficient than otto cycle
    (C) Both have same efficiency
    (D) Can't say

51. Ideal Rankine cycle consists of
    (A) Two isentropic and two constant volume processes
    (B) Two isothermal and two constant pressure processes
    (C) Two isentropic and two isothermal processes
    (D) Two isentropic and two constant pressure processes

52. In case of impulse steam turbine
    (A) There is pressure drop in moving blades only
    (B) There is pressure drop in fixed blades only
    (C) There is pressure drop in both fixed and moving blades
    (D) There is no pressure drop in the turbine

53. NPSH of a pump represents
    (A) Net positive stagnation head
    (B) Net power suction head
    (C) Net positive suction head
    (D) Negative pressure suction head

54. Negative slip is often associates with
    (A) Reciprocating pump
    (B) Rotodynamic pump
    (C) Axial pump
    (D) Jet pump

55. Equipment layout sequence in a vapour compression refrigeration system
    (A) Compressor → condenser → evaporator → expansion valve
    (B) Compressor → expansion valve → evaporator → condenser
    (C) Compressor → evaporator → expansion valve → condenser
    (D) Compressor → condenser → expansion valve → evaporator

56. 45° upward process line in a psychrometric chart represents
    (A) Cooling and dehumidification
    (B) Heating and humidification
    (C) Heating and dehumidification
    (D) Cooling and humidification

57. Chordal action is associated with
    (A) Belt drive
    (B) Rope drive
    (C) Gear drive
    (D) Chain drive

58. Among the following, selective irreversibility (change of input and output drive) is possible for

(A) Helical gear pair
(B) Bevel gear pair
(C) Herring bone gear pair
(D) Worm and worm wheel pair

59. 'Hot spot' is associated with

(A) Casting process
(B) Spot welding process
(C) Extrusion process
(D) Forging process

60. Internal thread cutting is called

(A) Forming
(B) Taping
(C) Broaching
(D) Shaping

61. The series combination of a 230 V, 100 W bulb and 230 V, 60 W bulb is connected to a 230 V, 50 Hz supply. Which bulb will glow brighter ?

(A) 230V, 100W bulb
(B) 230V, 60W
(C) Both will have equal brightness
(D) 230V, 100W bulb will burn off

62. The unit of temperature coefficient of resistance is

(A) Ohms/degree C
(B) Per degree C
(C) Unitless
(D) Degree C/Ohm

63. The direction of a dynamically induced emf can be found out using

(A) Right hand screw rule
(B) Flemings right hand rule
(C) Flemings left hand rule
(D) Both (A) and (B)

64. The form factor of a sinusoidal a.c. waveform is

(A) 0.707
(B) 0.636
(C) 1.11
(D) 1.414

65. In an R-L ac circuit, which of the following is true ?

(A) V leads I by 90 degrees
(B) V lags I by 90 degrees
(C) I lags V by an angle between 0 and 90
(D) I leads V by an angle between 0 and 90

66. Which of the following DC motor is used for electric traction ?

(A) DC series motor
(B) DC shunt motor
(C) Both (A) and (B)
(D) DC compound motor

67. A three phase induction motor with rated speed 1440 rpm is running at 1410 rpm. What is the operating slip ?

(A) 0.06% (C) 0.02%

(B) 6% (D) 2%

68. The protection delivered by ELCB is against

(A) Overfrequency (C) Overcurrent

(B) Overvoltage (D) Earth leakage current

69. Which of the following gives maximum lumens/watt ?

(A) Mercury vapour lamp (C) CFL

(B) Incandescent lamp (D) Sodium vapour lamp

70. Which of the following is used for high power applications ?

(A) Nickel cadmium (C) Nickel metal hydride

(B) Lithium ion (D) Lead acid

71. Which state has the maximum wind farm installations ?

(A) Jammu (C) Bihar

(B) Tamilnadu (D) West Bengal

72. Which among the following can have a value greater than one ?

(A) Demand factor (C) Utilisation factor

(B) Diversity factor (D) Load factor

73. 11000V system would be a part of

(A) Primary transmission (C) Primary distribution

(B) Secondary transmission (D) Secondary distribution

74. CRGO steel is used to

(A) To reduce hysteresis losses (C) To reduce eddy current losses

(B) To reduce copper losses (D) To reduce frictional losses

75. The need of high transmission voltage in the power system is

(A) To improve power factor (C) To improve safety level

(B) To reduce transmission losses (D) To reduce corona effect

76. In an N-type semiconductor, there are

(A) No minority carriers (C) Immovable positive ions

(B) Immovable negative ions (D) Holes as majority carriers

77. Electrical conductivity of a semiconductor

(A) Increases with rise in temperature

(B) Decreases with rise in temperature

(C) Does not change with rise in temperature

(D) First increase and then decrease with rise in temperature

78. If a 5:1 step down transformer has a primary current of 20mA, then the secondary current will be

(A) 4mA (C) 100mA

(B) 500mA (D) 0.8mA

79. Reverse biasing in a junction diode

(A) Decreases the potential barrier

(B) Increases the potential barrier

(C) Increases the number of minority charge carriers

(D) Increases the number of majority charge carriers

80. The rms value of the output current of a half wave rectifier with input current $I_o \sin \omega t$, is

(A) I_o/π (C) I_o

(B) $I_o/2$ (D) $2\ I_o$

81. The upper cut off frequency of an RC coupled amplifier mainly depends on

(A) Coupling capacitor

(B) Bypass capacitor

(C) Output capacitance of the signal source

(D) Inter electrode capacitance and shunt stray capacitance

82. Cross over distortion behaviour is characteristic of

(A) Class A output stage (C) Class AB output stage

(B) Class B output stage (D) Common base output stage

83. A BJT is said to be operating in the saturation region if

(A) Both junctions are reverse biased

(B) Base emitter junction is forward biased and base collector junction is reverse biased

(C) Base emitter junction is reverse biased and base collector junction is forward biased

(D) Both junctions are forward biased

84. The value of β for a transistor for which the value of α = 0.96 will be

(A) 2.4 (C) 0.24

(B) 24 (D) 48

85. For detecting light intensity

(A) Photodiode is reverse biased

(B) Photodiode is forward biased

(C) LED is reverse biased

(D) LED is forward biased

86. Figure of merit of a logic family is given by the product of

(A) Gain and bandwidth

(B) Propagation delay time and power dissipation

(C) Fan out and propagation delay time

(D) Noise margin and power dissipation

87. In commercial TV Transmission in India

(A) Picture is in VSB and speach is in VSB

(B) Picture is in FM and speach is in SSB

(C) Picture is in VSB and speach is in FM

(D) Picture is in FM and speach is in AM

88. Lissajous pattern obtain on a CRO screen can be used to determine

(A) Phase shift (C) Amplitude distortion

(B) Voltage (D) Current

89. Power is drawn by CMOS inverter only when

(A) Its output is high

(B) Its output is low

(C) It switches between logic levels

(D) It static state

90. The equivalent decimal number of binary number 11001.001 is

(A) 19.125 (C) 25.250

(B) 19.250 (D) 25.125

91. Logic X-OR operation of (**C4A0**)H & (3B5F)H results in

(A) 0000 (C) 1111

(B) ABCD (D) FFFF

92. In virtual memory, address generated by the CPU is known as

(A) Physical address
(B) Logical address
(C) Post relocation register address
(D) Absolute address

93. Add −3 and −8 which are represented as 5 bit, signed, 2's complement binary numbers and the result is

(A) 10101 with no overflow
(B) 10100 with overflow
(C) 11010 with overflow
(D) 10101 with overflow

94. The amount of time that elapses after the head is positioned over correct track until the starting position of the addressed sector passes under the read/write head in a hard disk is known as

(A) Seek time
(B) Access time
(C) Latency time
(D) Correction time

95. After executing the following program fragment with initial values of x = 5 and y = 10

```
x = x + y;
y = x – y;
x = x – y;
```

(A) Value of x will be transferred to y
(B) Value of y will be transferred to x
(C) Values of x and y will be interchanged
(D) Values of x and y will be zero

96. If an integer is represented using 16-bits in storage, then the maximum value of a signed integer is

(A) 2^{16}
(B) 2^{15}
(C) $2^{16}-1$
(D) $2^{15}-1$

97. What will be the output of the following fragment of code

```
for (int i=1;  i<10;  i+=5)
{   printf ("%d", i);
    ++i;
}
```

(A) 1 6 7
(B) 1 7
(C) 1 2 6
(D) 1 6 10

98. The separation of the data definition from the program is known as

(A) Data integrity
(B) Data indexing
(C) Data independence
(D) Data alignment

99. Referential integrity in a relational database refers to

(A) Every foreign key value must match with a foreign key value in an associated table

(B) Every primary key value must match with a foreign key value in an associated table

(C) Every foreign key value must match with a primary key value in an associated table

(D) Every primary key value must match with a primary key value in an associated table

100. Which of the following statements is correct about aggregate functions ?

(A) Count(*) ignores null

(B) Count(*) does not ignores null

(C) Avg() ignores null

(D) Count(*) returns error for null value

101. Phosphorescence means

(A) Spontaneous emission of light by a substance that has absorbed light

(B) Continuous glow of a beam on a screen even after its removal

(C) Persistence of an after image for approximately one sixteenth of a second on the retina

(D) Emission of visible light from a hot body as result of temperature

102. Total number of pixels in a display is known as

(A) Capacity

(B) Resolution

(C) Accuracy

(D) Range

103. Synchronization in serial communication is achieved through

(A) Error correction

(B) Error detection

(C) Start and stop bits

(D) Data manipulation

104. Bridge operates at the

(A) Physical layer

(B) Data link layer

(C) Network layer

(D) Application layer

105. When e-male is delivered from e-male client to e-male server, the protocol used is

(A) POP

(B) SMTP

(C) ICMP

(D) DHCP

106. The dimension of energy in MLT system is

(A) ML^2T^{-2}

(B) ML^2T^{-2}

(C) ML^3T^{-2}

(D) MLT^{-2}

107. If two forces of equal magnitude 'P' act perpendicular to each other their resultant is given by the expression

(A) P (C) $\sqrt{2}$ P

(B) 2P (D) $2\sqrt{2}$ P

108. Moment of Inertia of a triangle of base 'b' and altitude 'h' about its base is equal to

(A) $bh^3/12$ (C) $bh^3/64$

(B) $bh^3/36$ (D) $bh^3/8$

109. Maximum value of static friction is known as

(A) Limiting friction (C) Dry friction

(B) Sliding friction (D) Kinetic friction

110. The expression for no. of members 'n' of a perfect frame in terms of no. of joints 'j' can be written as

(A) $n = 2j + 3$ (C) $n = 2j/3$

(B) $n = 2j - 3$ (D) $n = 3j + 2$

111. The vector AB passing through A (1, 2, –1) and B (3, 2, 2) is

(A) $4i + 4j + k$ (C) $-2i - 3k$

(B) $2i + 4j - 3k$ (D) $2i + 3k$

112. Moment of inertia of a solid cylinder about a centroidal axis perpenticular to the cylinder is

(A) $MR^2/2$ (C) $MR^2/12$

(B) $MR^2/4$ (D) $MR^2/16$

113. Time of flight of a projectile is given by

(A) $2u \sin^2\alpha/g$ (C) $u^2 \sin^2\alpha/2g$

(B) $2u \sin\alpha/g$ (D) $u \sin\alpha/g$

114. The piston of an engine moves with simple harmonic motion. The crank rotates at 100 rpm; find the angular velocity in rad/sec.

(A) 0.10147 (C) 5.235

(B) 1.047 (D) 10.47

115. A body falls down from a height 'h' under the action of gravity 'g'. The velocity attained by it is

(A) gh (C) $\sqrt{2gh}$

(B) 2gh (D) $\sqrt{gh}$

116. A force of 200 kg acts for 0.8 seconds on a body of mass 6.4 kg which is initially at rest. The velocity attained by the body is

(A) 25m/s (C) 0.25m/s

(B) 2.5m/s (D) 250m/s

117. A body of mass m_A moving with uniform velocity of 8m/s collides with another body m_B at rest after which the two bodies together begin to move with uniform velocity of 6m/s. The ratio of masses m_A/m_B is

(A) 0.75 (C) 1.33

(B) 0.33 (D) 3.00

118. In order to double the period of a simple pendulum, its length should be

(A) Increased 2 times (C) Increased 4 times

(B) Decreased 2 times (D) Decreased 4 times

119. A simply supported beam AB of span 5m is loaded with a point load of 5 kN at C, 2m from support A and an UDL of intensity 2kN/m for the remaining span of 3m. Calculate the reaction at A is

(A) 6.2 kN (C) 3.6 kN

(B) 4.8 kN (D) 5.5 kN

120. A particle starting from rest moves in a straight line whose equation of motion is given by $S = 2t^3 - t^2 + 5$. The velocity of particle after 2 seconds is

(A) 20m/s (C) 16m/s

(B) 17m/s (D) 24m/s