



Centurion
UNIVERSITY

CENTURION UNIVERSITY ENTRANCE EXAMINATION

CUEE-2014

QUESTION BOOKLET FOR LATERAL ENTRY


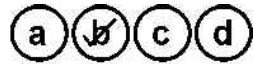




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INSTRUCTIONS

Roll Number

Please read the following instructions carefully:

1. Mention carefully your Roll Number, Question Booklet number in the OMR Answer Sheet and sign at the appropriate place. Write your Roll Number on the question booklet.
2. Strictly follow the instructions given by the Centre Supervisor/ Room Invigilator and those given on the Question Booklet.
3. Please mark the answer ONLY with a Black ball point pen on the OMR Answer Sheet.
4. Candidates are not allowed to carry any papers, notes, books, log table, calculators or calculating devices, scanning devices, communication devices like cellular phone/pager/duopen, etc. to the examination hall. Any candidate found using, or in possession of such unauthorized material, indulging in copying or impersonation, adopting unfair means is liable to be summarily disqualified and may be subjected to penal action.
5. After finishing the examination, hand over the complete question booklet and OMR Answer Sheet to the Room Invigilator. DO NOT carry the question booklet or any part there of outside the examination room. Doing so, is a punishable offence.
6. The test is of objective type. This Question Booklet contains three parts, with a total of 180 questions and the total time allotted is 3.00 hours.
Section-I:-Basic Electrical Engineering
Section-II:-Mathematics
Section-III:-Mechanics
7. Each objective type question is followed by four responses. Your task is to choose the correct/best response and mark your response by darkening the relevant CIRCLE with black Ball Point Pen on the OMR Answer Sheet and do not on the Question Booklet.
8. All questions are COMPULSORY. There will be "No NEGATIVE MARKING".
9. Completely darken the CIRCLE so that the number inside the CIRCLE is not visible. Darken ONLY ONE CIRCLE for each answer as shown in the example below. The CORRECT and the WRONG method of darkening the CIRCLE on the OMR sheet is given below.

CORRECT Method	WRONG Method
	
	
	
10. DO NOT make any stray marks anywhere on the OMR answer sheet. DO NOT fold or wrinkle the OMR answer sheet. Rough work MUST NOT be done on the answer sheet. Use your test booklet for this purpose.
11. In case you notice any questions missing in the question booklet, kindly bring it to the attention of the Invigilator.

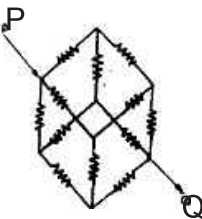
Spece for rough work

SECTION I - BASIC ELECTRICAL ENGINEERING

- Vent plug is provided in each lead acid cells to:
 - Pour water or electrolyte when needed
 - Check the electrolyte level
 - Allow escape out of gases during charging
 - All the above
 - The capacity of battery is expressed in:
 - Amperes
 - Ampere-hours
 - Watts
 - Watt-hour
 - Cells are connected in series in order to increase the
 - Current capacity
 - Life of the cells
 - Voltage ratings
 - Terminal voltage
 - During the discharge of lead acid battery, the terminal voltage decreases with the decrease in:
 - Temperature
 - Discharge rate
 - State of charge
 - None of the above
 - Moving Iron instruments can be used on:
 - ac and dc both
 - ac only
 - dc only
 - none of the above
 - The energy meter used for measuring energy of a dc circuit is:
 - ampere hour meter
 - induction type
 - electrostatic type
 - dynamometer type
 - Moving coil instruments are:
 - permanent magnet type
 - dynamometer type
 - induction type
 - permanent magnet and dynamometer type
 - The energy consumption of MI instrument as compared to MC instrument is:
 - same
 - more
 - less
 - very small
 - A circuit of zero lagging power factor behaves as:
 - An inductive circuit
 - A capacitive circuit
 - R-L circuit
 - R-C circuit
 - The power factor of an ac circuit is equal to:
 - Cosine of the phase angle
 - Sine of the phase angle
 - Tangent of the phase angle
 - Cotangent of the phase angle
 - The ratio of the effective value to the peak value is called the ___ factor:
 - Form
 - Peak
 - Average
 - Q-factor
 - The curve representing Ohms law is a:
 - Sine function
 - Linear
 - Parabola
 - Hyperbola
 - Transformer core is made up of:
 - Silicon sheet steel
 - Chrome steel
 - Low carbon steel
 - High content silicon steel
 - The transformer core laminations are insulated from each other by:
 - Paper
 - Thin varnish coating
 - Mica strip
 - All the above can be used for insulation
 - The output power of any electrical motor is taken from the:
 - Armature
 - Field
 - Coupling mounted on the shaft
 - Motor frame
 - If the back emf in a dc motor vanishes suddenly, then the motor:
 - Run at very high speeds
 - Start hunting
 - Burn
 - Come to stall
 - The direction of the armature current in a dc motor is:
 - The same as the generated emf
 - Opposite to that of generated emf
 - Not dependent upon the direction of the armature emf
 - None of the above
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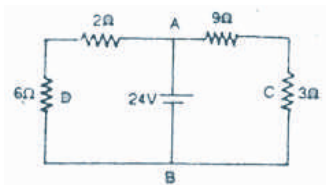
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18. When a dc machine is connected to the dc supply main it will produce:
 (a) EMF in opposition to the applied voltage
 (b) EMF in phase with the applied voltage
 (c) EMF decreases with time
 (d) None of the above
19. The horse power obtained from the motor shaft is called:
 (a) IHP (b) BHP
 (c) Useful torque (d) None of the above
20. The speed of dc shunt motor can be increased above its normal speed by:
 (a) Increasing the field current
 (b) Decreasing the field current
 (c) Decreasing the terminal voltage
 (d) Increasing the armature resistance
21. In a separately excited dc generator the field is connected to:
 (a) In series with an armature
 (b) Across the armature
 (c) To the external supply source
 (d) None of the above
22. If we increase the field of the dc generator, its emf output:
 (a) Increases indefinitely
 (b) Increases till the winding burns
 (c) Increases till the magnetic saturation takes place
 (d) First increases and then starts reducing
23. The terminal voltage of the dc shunt generator on loading:
 (a) Increases slightly (b) Decreases sharply
 (c) Decreases slightly (d) Increases sharply
24. In a rotating electrical machine the torque produced will be maximum when:
 (a) Torque angle is zero
 (b) Torque angle is 90 degrees
 (c) Two magnetic fields are aligned with each other
 (d) Field strengths are maximum and the torque angle is zero
25. The direction of rotation of dc shunt motor can be reversed by interchanging:
 (a) The supply terminals
 (b) The field terminals
 (c) The armature terminals only
 (d) Either field or armature terminals
26. The function of brushes in a DC Generator is to:
 (a) Collect the current from the commutator and supply it to external circuit
 (b) Prevent the sparking
 (c) Helps to provide good commutation by offering smooth surface
 (d) Provide continuity between adjacent commutator segments
27. Fleming's Left hand rule is applicable to:
 (a) DC generator (b) DC motor
 (c) Transformer (d) Alternator
28. Earth wire or ground wire is made of:
 (a) copper (b) aluminium
 (c) iron (d) galvanized steel
29. The objective of earthing or grounding is:
 a) to provide as low resistance possible to the ground
 b) to provide as high resistance possible to the ground
 c) to provide flow of positive, negative and zero sequence currents
 d) none of the above
30. Factors on which soil resistance depends:
 (a) depth of the electrode (b) moisture
 (c) NaCl (d) all the above
31. The speed of the induction motor depends on:
 (a) number of the stator poles
 (b) supply frequency
 (c) supply stator voltage
 (d) all the above
32. Slip ring induction motors have the advantage of:
 (a) High starting torque and high over load capacity
 (b) Very rugged construction
 (c) Cheap in cost (d) Both (a) and (b)
33. The power factor of an induction motor at full load is likely to be:
 (a) unity (b) 0.85 lag
 (c) 0.85 lead (d) 0.5 lag
34. In squirrel cage induction motor high starting torque is achieved by using:
 (a) high resistance in series with the rotor circuit
-

- (b) low resistance across rotor circuit
 (c) double cage rotor
 (d) none of the above
35. When the induction motor is stand still the slip will be:
 (a) zero (b) one
 (c) infinity (d) 0.5
36. A string of five series resistors is connected across a 6 V battery. Zero voltage is measured across all resistors except R_3 . The voltage across R_3 is
 (a) 0V (b) 1.2V
 (c) 6V (d) 0.6V
37. A certain series circuit consists of a $1/8$ W resistor, a $1/4$ W resistor, and a $1/2$ W resistor. The total resistance is $1200\ \Omega$. If each resistor is operating in the circuit at its maximum power dissipation, total current flow is
 (a) 27mA (b) 2.7mA
 (c) 19mA (d) 190mA
38. Twelve wires of same length and same cross-section are connected in the form of a cube as shown in figure below. If the resistance of each wire is R, then the effective resistance between P and Q will be



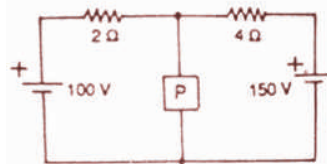
- (A)R (B) $5/6$ R
 (C) $3/4$ R (D) $4/3$ R.

39. The voltage drop across the resistor 9 ohm will be



- (A)18 V (B) 12 V
 (C) 9 V (D) 6 V.

40. A certain appliance uses 350 W. If it is allowed to run continuously for 24 days, how many kilowatt-hours of energy does it consume?
 (a) 20.16kWh (b) 201.6kWh
 (c) 2.01kWh (d) 8.4kWh
41. A 6 V battery is connected to a $300\ \Omega$ load. Under these conditions, it is rated at 40 Ah. How long can it supply current to the load?
 (a) 1h (b) 200h
 (c) 2000h (d) 10h
42. A $68\ \Omega$ resistor is connected across the terminals of a 3 V battery. The power dissipation of the resistor is
 (a) 132 mW (b) 13.2mW
 (c) 22.6mW (d) 226mW
43. Which value of resistance P shown in the circuit will allow 1080 Watts to be dissipated



- (A) 19.5 ohms (B) 14.5 ohms
 (C) 9.75 ohms (D) 5.55 ohms.

44. Which of the following plant is expected to have the longest expected life?
 (A) Hydroelectric (B) steam
 (C) Diesel (D) All have equal life.
45. A 100 MW thermal power-plant will consume nearly how many tonnes of coal in one hour ?
 (A) 50 tonnes (B) 150 tonnes
 (C) 1500 tonnes (D) 15,000 tonnes
46. The starting capacitor of a single phase motor is
 (A) Electrolytic capacitor
 (B) Ceramic capacitor
 (C) Paper capacitor
 (D) None of the above.

47. An electromagnetic field exists only when there is
 (a) an increasing current (b) decreasing current
 (c) voltage (d) current
48. A certain series *RLC* circuit with a 200 Hz, 15 V ac source has the following values: $R = 12 \Omega$, $C = 80 \mu\text{F}$, and $L = 10 \text{ mH}$. The total impedance, expressed in polar form, is
 (a) $12.28 \angle 12.34^\circ \Omega$ (b) $12.57 \angle 12.34^\circ \Omega$
 (c) $9.95 \angle 12.34^\circ \Omega$ (d) $12.62 \angle 12.34^\circ \Omega$
49. A heater is rated as 230V, 10kW, A.C. The value 230V refers to
 (a) Average voltage (b) r.m.s voltage
 (c) peak voltage (d) none
50. The peak value of a sine wave is 200V. Its average value is
 (a) 127.4V (b) 141.7V
 (c) 282.8V (d) 200V
51. Two waves of the same frequency have opposite phase when the phase angle between them is _____ degrees.
 (a) 360 (b) 180
 (c) 90 (d) 0
52. Form factor for a sine wave is
 (a) 1.414 (b) 0.707
 (c) 1.11 (d) 0.637
53. In a series resonant circuit, the impedance of the circuit is
 (a) Minimum (b) maximum
 (c) zero (d) none
54. As per Faraday's laws of electromagnetic induction, an emf is induced in a conductor whenever it
 (a) Lies perpendicular to the magnetic flux
 (b) lies in a magnetic field
 (c) cuts magnetic flux
 (d) Moves parallel to the direction of the magnetic field.
55. The law that the induced emf and current always oppose the cause producing them is due to
 (a) Faraday (b) Lenz
 (c) Newton (d) coulomb
56. The power drawn by the circuit whose input is 20KVA and p.f is 0.8 lagging
 (a) 12 (b) 20
 (c) 16 (d) 8
57. The power factor at resonance in *RLC* circuit is
 (a) zero (b) unity
 (c) 0.5 lagging (d) 0.5 leading
58. Capacitive reactance increases with decrease in
 (a) Capacitance (b) Frequency
 (c) Voltage (d) Both a & b
59. Which of the following is not correct?
 (a) $P = \frac{V}{R^2}$ (b) $P = VI$
 (c) $I = \sqrt{\frac{P}{R}}$ (d) $V = \sqrt{PR}$
60. The peak factor is ratio of
 (a) Average value of rms value
 (b) Rms value to average value
 (c) Peak value to average value
 (d) Peak value to RMS value

SECTION II - MATHEMATICS

61. If $w = \left(\frac{z-i}{1+iz}\right)^n$, n integer, then $|w| =$
- a. 0 b. 1/2
c. 1 d. 2
62. The complex number $\frac{1+2i}{1-i}$ lies in
- a. First Quadrant b. Second Quadrant
c. Third Quadrant d. Fourth Quadrant
63. If $\arg(Z) < 0$, then $\arg(-Z) - \arg(Z) =$ _____
- a. π b. $-\pi$
c. $-\pi/2$ d. $\pi/2$
64. If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$, then
- a. $x = 0, y = 2$ b. $x = 0, y = -2$
c. $x = 2, y = 0$ d. $x = 2, y = 2$
65. If ω is a complex cube root of unity, then the value of $(3 + \omega^2 + \omega^4)^6 =$
- a. 64 b. 729
c. 2 d. 0
66. The number of arrangements of letters of the word BANANA in which the two 'N' do not appear adjacently is
- a. 40 b. 60
c. 80 d. 100
67. If ${}^9P_5 + 5 \times {}^9P_4 = 10P_4$, then $r =$
- a. 4 b. 5
c. 8 d. 10
68. The number of ways dividing equally a pack of 52 cards among 4 players is
- a. $\frac{52!}{13!}$ b. $\frac{52!}{(13!)^2}$
c. $\frac{52!}{(13!)^4}$ d. $\frac{52!}{(13!)^4}$
69. If the r th term in the expansion of $\left(\frac{x}{3} - \frac{2}{x^2}\right)^{10}$ contains x^4 , then $r =$
- a. 2 b. 3
c. 4 d. 5
70. The coefficient of x^n in the expansion of $(1 + x + x^2 + x^3 + \dots)^{-n}$
- a. 1 b. $(-1)^n$
c. n d. $n+1$
71. $\begin{vmatrix} \frac{1}{a} & 1 & bc \\ \frac{1}{b} & 1 & ca \\ \frac{1}{c} & 1 & ab \end{vmatrix} =$
- a. $1/abc$ b. 0
c. abc d. None of these
72. If $1, \omega, \omega^2$ are the cube roots of unity, then the value of the determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is
- a. 0 b. ω
c. ω^2 d. 1
73. If a matrix A is symmetric as well as skew-symmetric, then
- a. A is a diagonal matrix
b. A is a null matrix
c. A is a unit matrix
d. A is a triangular matrix
74. If A is an invertible matrix, then $\det(A^{-1})$ is equal to
- a. 1 b. $|A|$
c. $\frac{1}{|A|}$ d. none of these
75. If A is a square matrix, then $A + A^T$ is a
- a. diagonal matrix b. symmetric matrix
c. skew-symmetric matrix d. none of these

76. The system of equations $2x + 3y = 7$, $14x + 21y = 49$ has
- a. Infinitely many solutions b. A unique solution
 b. No solution d. Finitely many solution
77. If the system of equations $x - ky - z = 0$, $kx - y - z = 0$, $x + y - z = 0$ has a non-zero solution, then the possible values of k are
- a. -1,2 b. 1,2
 c. 0,1 d. -1,1
78. The value of $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \dots \dots \cos 359^\circ$ is
- a. -1 b. 0
 c. $\frac{1}{3}$ d. $\frac{1}{\sqrt{2}}$
79. The value of $\sin^6 \theta + \cos^6 \theta + 3\sin^2 \theta \cos^2 \theta$ is
- a. 0 b. 1
 c. 2 d. 3
80. The value of $(\cos 11^\circ + \sin 11^\circ) / (\cos 11^\circ - \sin 11^\circ)$ is
- a. $\tan 45^\circ$ b. $\cot 11^\circ$
 c. $\tan 56^\circ$ d. $\tan 60^\circ$
81. If $\sin \theta = \sin \alpha$, then the angles θ and α are related by
- a. $\theta = n\pi \pm \alpha$ b. $\theta = 2n\pi + (-1)^n \alpha$
 c. $\alpha = n\pi + (-1)^n \theta$ d. $\theta = (2n + 1)\pi + \alpha$
82. $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3} =$
- a. $\frac{\pi}{4}$ b. $\frac{\pi}{6}$
 c. $\frac{\pi}{2}$ d. π
83. In a triangle ABC, $(a-b)^2 \cos^2 \frac{C}{2} + (a+b)^2 \sin^2 \frac{C}{2}$ equals to
- a. a^2 b. b^2
 c. c^2 d. none of these
84. The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is
- a. $\frac{1}{2}$ b. $\frac{1}{\sqrt{2}}$
 c. 1 d. 0
85. The value of $\sin \cot^{-1} x$ is
- a. $\sqrt{1+x^2}$ b. x
 c. $(1+x^2)^{-\frac{1}{2}}$ d. $(1+x^2)^{\frac{1}{2}}$
86. If the lines $3x + 4y = 1$, $y = x + 5$ and $5y + bx = 3$ are congruent then the value of b is
- a. 6 b. 3
 c. 1 d. 0
87. Find the equation of the straight line which passes through (1, 2) and is perpendicular to the line $x + y + 4 = 0$.
- a. $x + y + 1 = 0$ b. $x - y + 1 = 0$
 c. $x - y - 1 = 0$ d. $y - x + 1 = 0$
88. The line $y - x + 2 = 0$ divides the join of points (3, -1) and (8, 9) in the ratio
- a. 1:2 b. 3:2
 c. 1:3 d. 2:3
89. The triangle joining the points A (2, 7), B (4, -1), C (-2, 6) is
- a. Equilateral c. right-angled
 b. isosceles d. none of these
90. The length of the tangent from (5, 1) to the circle $x^2 + y^2 + 6x - 4y - 3 = 0$ is
- a. 81 b. 29
 c. 21 d. 7
91. The circle $x^2 + y^2 + 4x - 7y + 12 = 0$ cuts an intercept on y-axis equal to
- a. 1 b. 3
 c. 4 d. 7

92. If the equation $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$ represents a circle then the condition will be

- a. $a = b$ and $c = 0$
- b. $f = g$ and $h = 0$
- c. $a = b$ and $h = 0$
- d. $f = g$ and $c = 0$

93. Two vectors are said to be equal if

- a. Their magnitude is same
- b. Direction is same
- c. Originate from the same point
- d. None of these

94. If \vec{a} be a non-zero vector, then which of the following is correct

- a. $\vec{a} \cdot \vec{a} = 0$
- b. $\vec{a} \cdot \vec{a} > 0$
- c. $\vec{a} \cdot \vec{a} \geq 0$
- d. $\vec{a} \cdot \vec{a} \leq 0$

95. $\vec{a} \cdot \vec{b} = 0$ implies that

- a. $\vec{a} = 0$
- b. $\vec{b} = 0$
- c. $\theta = 90^\circ$
- d. either $\vec{a} = 0$ or $\vec{b} = 0$

96. $[\vec{a} \ \vec{b} \ \vec{c}]$ is the scalar triple product of three vectors \vec{a}, \vec{b} and \vec{c} , then $[\vec{a} \ \vec{b} \ \vec{c}] =$

- a. $[\vec{b} \ \vec{a} \ \vec{c}]$
- b. $[\vec{c} \ \vec{b} \ \vec{a}]$
- c. $[\vec{b} \ \vec{c} \ \vec{a}]$
- d. $[\vec{a} \ \vec{c} \ \vec{b}]$

97. If \vec{a}, \vec{b} and \vec{c} are any three coplanar unit vectors, then

- a. $\vec{a} \cdot (\vec{b} \times \vec{c}) = 1$
- b. $\vec{a} \cdot (\vec{b} \times \vec{c}) = 3$
- c. $(\vec{c} \times \vec{a}) \cdot \vec{b} = 0$
- d. $(\vec{a} \times \vec{b}) \cdot \vec{c} = 0$

98. The vectors $2i + j - k$ perpendicular to $i - 4j + ak$, if $a =$

- a. 0
- b. -1
- c. -2
- d. -3

99. If a and b are two vectors such that $a \cdot b = 0$ and $a \times b = 0$ then

- a. \vec{a} is parallel to \vec{b}
- b. \vec{a} is perpendicular to \vec{b}

c. Either \vec{a} or \vec{b} is a null vector

d. None of these

100. Evaluate $\lim_{x \rightarrow 1} \frac{x^3 + x^2 - 2}{\sin(x - 1)}$

- a. $\frac{9}{2}$
- b. $\frac{2}{9}$
- c. 5
- d. 7

101. $\lim_{x \rightarrow 0} \frac{\sqrt{1 - \cos 2x}}{\sqrt{2}x}$ is _____.

- a. 1
- b. -1
- c. 0
- d. None of these

102. If $\lim_{x \rightarrow 0} \frac{\log(3+x) - \log(3-x)}{x} = K$ the value of K is

- a. 0
- b. $-\frac{1}{3}$
- c. $\frac{2}{3}$
- d. $-\frac{2}{3}$

103. $\lim_{h \rightarrow \infty} \frac{n!}{(n+1)! - n!}$ is equal to _____.

- a. 0
- b. ∞
- c. 1
- d. None of these

104. If $f(x)$ be a continuous function and $g(x)$ be discontinuous, then

- a. $f(x) + g(x)$ must be continuous
- b. $f(x) + g(x)$ must be discontinuous
- c. $f(x) = g(x) \forall x$
- d. Can't be said

105. The function $f(x) = \frac{x}{1 + |x|}$ is _____.

- a. continuous for all x but differentiable at $x = 0$.
- b. continuous as well as differentiable for all x .

- c. neither continuous nor differentiable at $x = 0$.
 d. differentiable for all x but not continuous at $x=0$.

106. If $\sin \sin y = x \sin(a+y)$ then $\frac{dy}{dx}$ is
- a. $\frac{\sin a}{\sin a \sin^2(a+y)}$ b. $\frac{\sin^2(a+y)}{\sin a}$
 c. $\sin a \sin^2(a+y)$ d. $\frac{\sin^2(a-y)}{\sin a}$

107. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ is _____
- a. $\frac{1+x}{1+\log x}$ b. $\frac{1-\log x}{1+\log x}$
 c. Not defined d. $\frac{\log x}{(1+\log x)^2}$

108. The points on the curve $y^2 = 4a \left(x + a \sin \frac{x}{a} \right)$ at which the tangent is parallel to x - axis, lie on
- a. a straight line b. a parabola
 c. a circle d. an ellipse

109. The curve $y = ax^3 + bx^2 + cx + 5$ touches the x -axis at $A(-2, 0)$ and cuts the y - axis at a point B where its slope is 3. The values of a , b and c are

- a. $a = \frac{1}{2}, b = -\frac{3}{4}, c = 3$ b. $a = -\frac{1}{2}, b = -\frac{3}{4}, c = 3$
 c. $a = \frac{1}{2}, b = \frac{3}{4}, c = 3$ d. None of these

110. If the line $ax + by + c = 0$ is a normal to the curve, $xy = 1$ then
- a. $a > 0, b > 0$ b. $a > 0, b < 0$ or $a < 0, b > 0$
 c. $a=0, b=0$ d. $a < 0, b < 0$

111. Let, $f(x) = 1 + 3x^2 + 3^2x^4 + \dots + 3^{30}x^{60}$ Then $f(x)$ has

- a. at least one maximum
 b. exactly one maximum
 c. at least one minimum
 d. exactly one minimum

112. $\int \frac{e^x(1+x)}{\sin^2(xe^x)} dx$ is equal to:

- a. $\tan(e^x) + C$ b. $x \tan(e^x) + C$
 c. $\cot(xe^x) + C$ d. $-\cot(xe^x) + C$

113. $\int \frac{x^3 - 1}{x^3 + x} dx$ is equal to

- a. $x + \log x + \frac{1}{2} \log(x^2 + 1) - \tan^{-1} x + C$
 b. $x - \log x + \frac{1}{2} \log(x^2 + 1) - \tan^{-1} x + C$
 c. $x + \log x + \frac{1}{2} \log(x^2 + 1) + \tan^{-1} x + C$
 d. None of these

114. The value of $\int_0^2 |1-x| dx$ is equal to

- a. -1 b. 1
 c. 0 d. 2

115. $\int_0^a f(x) dx$ equals to

- a. $\int_a^0 f(a-x) dx$ b. $\int_0^a f(a+x) dx$
 c. $\int_0^a f(a-x) dx$ d. None of these

116. The area enclosed by the parabola $ay = 3(a^2 - x^2)$ is

- a. $16a^2$ sq. units b. $4a^2$ sq. units
c. $64a^2$ sq. units d. a^2 sq. units

117. The angle of intersection of the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ at origin is

- a. $\frac{\pi}{3}$ b. $\frac{\pi}{2}$
c. $\frac{\pi}{4}$ d. None of these

118. What is the order and degree of the differential

equation $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = c^2 \left(\frac{d^2y}{dx^2}\right)^2$

- a. 2, 2 c. 2, 1
b. 1, 2 d. 2, 3

119. The probability of getting heads in both trials, when a balanced coin is tossed twice, will be

- a. $\frac{1}{4}$ b. $\frac{1}{2}$
c. 1 d. $\frac{3}{4}$

120. Two dice are thrown. The probability that the sum of the points on two dice will be 7 is

- a. $\frac{5}{36}$ b. $\frac{6}{36}$
c. $\frac{7}{36}$ d. $\frac{8}{36}$

SECTION III - MECHANICS

121. Forces are called concurrent when their lines of action meet in
(a) one point (b) two points
(c) plane (d) perpendicular planes
122. Forces are called coplanar when all of them acting on body lie in
(a) one point (b) one plane
(c) different planes (d) perpendicular planes
123. A force acting on a body may
(a) introduce internal stresses
(b) retard its motion
(c) change its motion (d) all of the above.
124. Which is the correct statement about law of polygon of forces ?
(a) if any number of forces acting at a point can be represented by the sides of a polygon taken in order, then the forces are in equilibrium
(b) if any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon, then the forces are in equilibrium
(c) if a polygon representing forces acting at a point is closed then forces are in equilibrium
(d) if any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon taken in order, then the forces are in equilibrium
125. Effect of a force on a body depends upon
(a) magnitude (b) direction
(c) position or line of action (d) all of the above
126. If a number of forces act simultaneously on a particle, it is possible
(a) not to replace them by a single force
(b) to replace them by a single force
(c) to replace them by a single force through C.G.
(d) to replace them by a couple
127. A force is completely defined when we specify
(a) magnitude (b) direction
(c) point of application (d) all of the above
128. The algebraic sum of the resolved parts of a number of forces in a given direction is equal to the resolved part of their resultant in the same direction. This is as per the principle of
(a) forces (b) independence of forces
(c) dependence of forces
(d) resolution of forces.
129. The resolved part of the resultant of two forces inclined at an angle θ in a given direction is equal to
(a) the algebraic sum of the resolved parts of the forces in the given direction
(b) the sum of the resolved parts of the forces in the given direction
(c) the difference of the forces multiplied by the cosine of θ
(d) the sum of the forces multiplied by the sine of θ
130. Which of the following do not have identical dimensions ?
(a) Momentum and impulse (b) Torque and energy
(c) Torque and work
(d) Moment of a force and angular momentum.
131. Which of the following is not the unit of distance ?
(a) angstrom (b) light year
(c) micron (d) milestone.
132. Which of the following is not the unit of power ?
(a) kW (kilowatt) (b) hp (horse power)
(c) kcal/sec (d) kcal/kg sec.
133. Which of the following is not the unit of work, energy and heat ?
(a) kcal (b) kg m
(c) kWhr (d) hp

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134. Which of the following is not the unit of pressure?
 (a) kg/cm (b) ata
 (c) atmosphere (d) newton.
135. The weight of a body is due to
 (a) centripetal force of earth
 (b) gravitational pull exerted by the earth
 (c) forces experienced by body in atmosphere
 (d) gravitational force of attraction towards the centre of the earth.
136. The forces, which meet at one point, but their lines of action do not lie in a plane, are called
 (a) coplanar non-concurrent forces
 (b) non-coplanar concurrent forces
 (c) non-coplanar non-concurrent forces
 (d) intersecting forces.
137. When trying to turn a key into a lock, following is applied
 (a) coplanar force (b) non-coplanar forces
 (c) lever (d) couple.
138. Which of the following is not a scalar quantity
 (a) time (b) mass
 (c) volume (d) acceleration.
139. According to principle of transmissibility of forces, the effect of a force upon a body is
 (a) maximum when it acts at the centre of gravity of a body
 (b) different at different points in its line of action
 (c) the same at every point in its line of action
 (d) minimum when it acts at the C.G. of the body
140. Which of the following is a vector quantity
 (a) energy (b) mass
 (c) momentum (d) angle
141. A number of forces acting at a point will be in equilibrium if
 (a) their total sum is zero
 (b) two resolved parts in two directions at right angles are equal
 (c) sum of resolved parts in any two perpendicular directions are both zero
 (d) all of them are inclined equally
142. Two non-collinear parallel equal forces acting in opposite direction
 (a) balance each other
 (b) constitute a moment
 (c) constitute a couple
 (d) constitute a moment of couple.
143. According to principle of moments
 (a) if a system of coplanar forces is in equilibrium, then their algebraic sum is zero
 (b) if a system of coplanar forces is in equilibrium, then the algebraic sum of their moments about any point in their plane is zero
 (c) the algebraic sum of the moments of any two forces about any point is equal to moment of their resultant about the same point
 (d) positive and negative couples can be balanced
144. Which of the following is not a vector quantity
 (a) weight (b) velocity
 (c) acceleration (d) force
145. According to law of triangle of forces
 (a) three forces acting at a point will be in equilibrium
 (b) three forces acting at a point can be represented by a triangle, each side being proportional to force
 (c) if three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium
 (d) if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two.
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146. If a rigid body is in equilibrium under the action of three forces, then
(a) these forces are equal
(b) the lines of action of these forces meet in a point
(c) the lines of action of these forces are parallel
(d) (b) and (c) above
147. D' Alembert's principle is used for
(a) reducing the problem of kinetics to equivalent statics problem
(b) determining stresses in the truss
(c) stability of floating bodies
(d) designing safe structures.
148. A heavy ladder resting on floor and against a vertical wall may not be in equilibrium, if
(a) the floor is smooth, the wall is rough
(b) the floor is rough, the wall is smooth
(c) the floor and wall both are smooth surfaces
(d) the floor and wall both are rough surfaces
149. According to Lami's theorem
(a) three forces acting at a point will be in equilibrium
(b) three forces acting at a point can be represented by a triangle, each side being proportional to force
(c) if three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium
(d) if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two.
150. Two coplanar couples having equal and opposite moments
(a) balance each other
(b) produce a couple and an unbalanced force
(c) are equivalent
(d) cannot balance each other.
151. A framed structure is perfect if it contains members equal to
(a) $2n-3$ (b) $n-1$
(c) $'2n-1$
(d) $n - 2$ where $n =$ number of joints in a frame
152. The product of either force of couple with the arm of the couple is called
(a) resultant couple (b) moment of the forces
(c) resulting couple (d) moment of the couple
153. The centre of gravity of a uniform lamina lies at
(a) the centre of heavy portion
(b) the bottom surface
(c) the mid point of its axis
(d) all of the above
154. Centre of gravity of a solid cone lies on the axis at the height
(a) one-fourth of the total height above base
(b) one-third of the total height above base
(c) one-half of the total height above base
(d) three-eighth of the total height above the base
155. Centre of percussion is
(a) the point of C.G.
(b) the point of metacentre
(c) the point of application of the resultant of all the forces tending to cause a body to rotate about a certain axis
(d) point of suspension.
156. Centre of gravity of a thin hollow cone lies on the axis at a height of
(a) one-fourth of the total height above base
(b) one-third of the total height above base
(c) one-half of the total height above base
(d) three-eighth of the total height above the base.
157. The units of moment of inertia of an area are
(a) kg m^2 (b) m^4
(c) kg/m^2 (d) m^3
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158. The centre of gravity of a triangle lies at the point of
 (a) concurrence of the medians
 (b) intersection of its altitudes
 (c) intersection of bisector of angles
 (d) intersection of diagonals
159. A trolley wire weighs 1.2 kg per metre length. The ends of the wire are attached to two poles 20 metres apart. If the horizontal tension is 1500 kg find the dip in the middle of the span
 (a) 2.5 cm (b) 3.0 cm
 (c) 4.0 cm (d) 5.0 cm
160. The resultant of the following three couples 20 kg force, 0.5 m arm, +ve sense 30 kg force, 1 m arm, - ve sense 40 kg force, 0.25 m arm, + ve sense having arm of 0.5 m will be
 (a) 20 kg, - ve sense
 (b) 20 kg, + ve sense
 (c) 10 kg, + ve sense
 (d) 10 kg, - ve sense
161. Angle of friction is the
 (a) angle between normal reaction and the resultant of normal reaction and the limiting friction
 (b) ratio of limiting friction and normal reaction
 (c) ratio of minimum friction force to the friction force acting when the body is just about to move
 (d) ratio of minimum friction force to friction force acting when the body is in motion.
162. The coefficient of friction depends on
 (a) area of contact (b) shape of surfaces
 (c) strength of surfaces (d) nature of surface.
163. Least force required to draw a body up the inclined plane is $W \sin(\text{plane inclination} + \text{friction angle})$ applied in the direction
 (a) along the plane (b) horizontally
 (c) vertically
 (d) at an angle equal to the angle of friction to the inclined plane.
164. The ratio of limiting friction and normal reaction is known as
 (a) coefficient of friction (b) angle of friction
 (c) angle of repose (d) sliding friction
165. Which one of the following statements is not correct
 (a) the tangent of the angle of friction is equal to coefficient of friction
 (b) the angle of repose is equal to angle of friction
 (c) the tangent of the angle of repose is equal to coefficient of friction
 (d) the sine of the angle of repose is equal to coefficient to friction
166. On a ladder resting on smooth ground and leaning against vertical wall, the force of friction will be
 (a) towards the wall at its upper end
 (b) away from the wall at its upper end
 (c) upwards at its upper end
 (d) downwards at its upper end
167. On the ladder resting on the ground and leaning against a smooth vertical wall, the force of friction will be
 (a) downwards at its upper end
 (b) upwards at its upper end
 (c) perpendicular to the wall at its upper end
 (d) zero at its upper end
168. Coefficient of friction is the
 (a) angle between normal reaction and the resultant of normal reaction and the limiting friction
 (b) ratio of limiting friction and normal reaction
 (c) the friction force acting when the body is just about to move
 (d) the friction force acting when the body is in motion
169. Pick up wrong statement about friction force for dry surfaces. Friction force is

-
- (a) proportional to normal load between the surfaces
(b) dependent on the materials of contact surface
(c) proportional to velocity of sliding
(d) independent of the area of contact surfaces.
170. If rain is falling in the opposite direction of the movement of a pedestrian, he has to hold his umbrella
(a) more inclined when moving
(b) less inclined when moving
(c) more inclined when standing
(d) less inclined when standing
171. A projectile is fired at an angle θ to the vertical. Its horizontal range will be maximum when θ is
(a) 0° (b) 30°
(c) 45° (d) 60°
172. From a circular plate of diameter 6 cm is cut out a circle whose diameter is a radius of the plate. Find the C.G. of the remainder from the centre of circular plate
(a) 0.5 cm (b) 1.0 cm
(c) 1.5 cm (d) 2.5 cm
173. Mechanical advantage is equal to
a. Load/effort b. Effort/load
c. Effort/distance moved by the load
d. Load/distance moved by the effort
174. Strain is defined as the ratio of
a. change in volume to original volume
b. change in length to original length
c. change in cross-sectional area to original cross-sectional area
d. any one of the above
175. Hooke's law holds good upto
a. yield point b. limit of proportionality
c. breaking point d. elastic limit
176. Young's modulus is defined as the ratio of
a. Volumetric stress and volumetric strain
b. lateral stress and lateral strain
c. Longitudinal stress and longitudinal strain
d. shear stress to shear strain
177. The materials having same elastic properties in all directions are called
a. ideal materials b. uniform materials
c. isotropic materials d. practical materials
178. If the radius of wire stretched by a load is doubled, then its Young's modulus will be
a. Doubled b. Halved
c. Become four times d. Remain unaffected.
179. On a ladder resting on a smooth ground and leaning against vertical wall. The force of the friction will be
a. Towards the wall at its upper ends
b. Away from the wall at its upper ends
c. Upward at its upper ends
d. Zero at its upper end
180. Coulomb friction is the friction between
a. Bodies having relative motion
b. Two dry surfaces
c. Two liquid surfaces
d. Solids and liquids
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Spece for rough work

ANSWER KEYS - B.Tech (Lateral Entry)

SECTION I - BASIC ELECTRICAL ENGINEERING

Questions & Answers

1. d	11. a	21. c	31. d	41. c	51. b
2. b	12. b	22. c	32. d	42. a	52. c
3. c	13. a	23. c	33. b	43. c	53. a
4. b	14. b	24. b	34. c	44. a	54. c
5. a	15. c	25. d	35. b	45. a	55. b
6. a	16. c	26. a	36. c	46. a	56. c
7. d	17. b	27. b	37. a	47. d	57. b
8. b	18. a	28. d	38. b	48. a	58. d
9. a	19. c	29. a	39. a	49. b	59. a
10. a	20. b	30. d	40. b	50. a	60. d

SECTION II - MATHEMATICS

Questions & Answers

61. c	71. b	81. c	91. a	101. d	111. d
62. b	72. a	82. a	92. c	102. c	112. d
63. a	73. b	83. c	93. d	103. a	113. b
64. b	74. c	84. d	94. b	104. b	114. b
65. a	75. b	85. d	95. c	105. b	115. c
66. a	76. a	86. a	96. c	106. b	116. b
67. b	77. d	87. b	97. d	107. d	117. b
68. d	78. b	88. d	98. c	108. b	118. a
69. a	79. b	89. c	99. c	109. b	119. a
70. b	80. c	90. d	100. c	110. b	120. b

SECTION III - MECHANICS

Questions & Answers

121. a	131. d	141. c	151. a	161. a	171. c
122. b	132. d	142. c	152. d	162. d	172. a
123. d	133. d	143. b	153. c	163. d	173. a
124. d	134. d	144. a	154. a	164. a	174. d
125. d	135. d	145. c	155. c	165. d	175. b
126. b	136. b	146. d	156. b	166. c	176. c
127. d	137. d	147. a	157. b	167. d	177. c
128. d	138. d	148. c	158. a	168. b	178. d
129. a	139. c	149. d	159. c	169. c	179. c
130. d	140. c	150. d	160. a	170. d	180. a