

Question Paper of BHU MCA - 2014 (Set No. 2)

14P/203/31(ii)

No. of Questions : 150

प्रश्नों की संख्या : 150

Time : $2\frac{1}{2}$ Hours

Full Marks : 450

समय : $2\frac{1}{2}$ घण्टे

पूर्णाङ्क : 450

Note : (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. **One mark will be deducted for each incorrect answer. Zero** mark will be awarded for each unattempted question.

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न 3 (तीन) अंकों का है। प्रत्येक गलत उत्तर के लिए एक अंक काटा जायेगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा।

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

- Fill in the gap by the alternatives :
"I told you about the incident yesterday, _____ I."
(1) didn't (2) don't (3) do (4) did
- "My best friend, John, is named _____ his grandfather."
Fill in the gap by the appropriate alternative :
(1) to (2) about (3) after (4) on
- "Birds of same _____ flock together."
Fill in the blank from the given alternatives :
(1) feather (2) colour (3) group (4) foreign
- What is the synonym of 'Crucial' ?
(1) Active (2) Dependent (3) Extremely important (4) Reserve
- Fill in the blanks by selecting one from the given alternatives :
"Ram, you can call me _____ Mondya _____ 3 O'clock the after noon."
(1) in, on, at (2) at, on, in (3) on, at, in (4) in, at, on
- The President of India can be removed from his office by the :
(1) Prime Minister (2) Lok Sabha (3) Chief Justice of India (4) Parliament
- The next Common Wealth Games will be held in :
(1) Edinburgh (2) Kuala Lumpur (3) Glasgow (4) Gold Coast

8. What is the name of the first antibiotic discovered ?
 (1) Penicillin (2) Streptomycin (3) Actinomycin (4) Tetracycline
9. Who is the present Governor of Reserve Bank of India ?
 (1) D. Subbarao (2) C. Rangarajan (3) Raghuram Rajan (4) Osborne Smith
10. Polio myelitis is a type of :
 (1) bacterial disease (2) viral disease (3) fungal disease (4) None of these
11. Tides in sea are caused by :
 (1) Effect of sun (2) Effect of Moon
 (3) Combined effect of Sun and Moon (4) Gravitational, centripetal and centrifugal forces
12. Who founded the Bharatiya Janasangh ?
 (1) Dr. Shyama Prasad Mukherjee (2) Deen Dayal Upadhyaya
 (3) Veer Savarkar (4) Atal Behari Vajpayee
13. Which of the following cities is known as the commercial capital of India ?
 (1) New Delhi (2) Kolkata (3) Chennai (4) Mumbai
14. Which of the following is not provided in the Constitution of India ?
 (1) Election Commission (2) Finance Commission
 (3) Public Service Commission (4) Planning Commission
15. The largest revenue source in India is :
 (1) Railways (2) Sales Tax (3) Excise Duty (4) Direct Tax
16. The line $x + y = 6$ is normal to the parabola $y^2 = 8x$ at the point :
 (1) (4, 2) (2) (2, 4) (3) (2, 2) (4) (3, 3)
17. If $f(x) = \frac{x-1}{x+1}$, then $f(2x)$ is :
 (1) $\frac{f(x)+1}{f(x)+3}$ (2) $\frac{3f(x)+1}{f(x)+3}$ (3) $\frac{f(x)+3}{f(x)+1}$ (4) $\frac{f(x)+1}{f(x)+3}$
18. For $2 \leq r \leq n$, ${}^n C_r + 2 {}^n C_{r-1} + {}^n C_{r-2} = ?$
 (1) ${}^{n+1} C_{r-1}$ (2) $2 {}^{n+1} C_{r+1}$ (3) $2 {}^{n+2} C_r$ (4) ${}^{n+2} C_r$
19. If μ is the coefficient of friction between two bodies in contact, then :
 (a) $0 \leq \mu \leq 1$ (2) $-1 \leq \mu \leq 1$ (3) $-\frac{1}{2} \leq \mu \leq \frac{1}{2}$ (4) $\mu > 1$
20. If $\tan^{-1} 4x + \tan^{-1} 6x = \frac{\pi}{4}$, then x equal to :
 (1) $\frac{1}{12}$ (2) $-\frac{1}{2}$ (3) $-\frac{1}{12}$ (4) None of these
21. If $x^y = a^b$, a, b being constants, then $\frac{dy}{dx} = ?$
 (1) $\frac{y}{x \log x}$ (2) $\frac{y \log x}{x}$ (3) $-\frac{y}{x \log x}$ (4) $\frac{x}{y \log x}$
22. Consider the following statements :
 $A = \lim_{x \rightarrow 0} (1 - \lambda x)^{1/x} = e^{-\lambda}$; $B = \lim_{x \rightarrow \infty} \left(1 - \frac{\lambda}{x}\right) = e^{-\lambda}$ In your opinion :
 (1) Only A is correct (2) Only B is correct
 (3) Both A and B are correct (4) Both A and B are incorrect

23. From the matrix equation $AB = AC$ we can conclude $B = C$ provided A is :
 (1) Singular (2) Non-singular (3) Symmetric (4) Square
24. Consider the following statements :
 A : Matrix multiplication is associative.
 B : Matrix multiplication is not commutative, in general.
 C : Product of two matrices may be a null matrix, while neither of them is a null matrix.
 In your opinion :
 (1) A is incorrect
 (2) B is incorrect
 (3) C is incorrect
 (4) All the three statements are correct
25. If the sum of the co-efficients in the expansion of $(a + b)^n$ is 1024, then the largest coefficient in the expansion is :
 (1) 84 (2) 126 (3) 168 (4) 252
26. Four men and four women are to sit around a circular table such that there is a man on either side of every woman. The number of seating arrangements is :
 (1) $3! \times 4!$ (2) $(3!)^2$ (3) $(4!)^2$ (4) $2(3!)^2$
27. There are 4 letters and 4 directed envelopes. The number of ways all the letters are placed in a wrong envelope is :
 (1) 6 (2) 8 (3) 9 (4) 12
28. The number of roots of the equation :
 $9 \sec^2 \theta - 9 \sec \theta + 2 = 0$, is :
 (1) 0 (2) 1 (3) 2 (4) 4
29. If the ratio of the roots of $x^2 + bx + c = 0$ and $x^2 + qx + r = 0$ be the same, then :
 (1) $b^2q = cr^2$ (2) $b^2r = q^2c$ (3) $bq = cr$ (4) $br = cq$
30. The number of real roots of the equation :
 $|x|^2 - 5|x| + 4 = 0$, is :
 (1) 1 (2) 2 (3) 3 (4) 4
31. The value of $\sqrt{8 + 2\sqrt{8 + 2\sqrt{8 + 2\sqrt{\dots}}}}$
 (1) 4 (2) 6 (3) 8 (4) 10
32. If every pair from the equations $x^2 + px + qr = 0$; $x^2 + qx + pr = 0$ and $x^2 + rx + pq = 0$ has a common root, then the product of the three roots is :
 (1) \sqrt{qpr} (2) pqr (3) $p^2q^2r^2$ (4) $2pqr$
33. The angle of elevation of the top of an incomplete vertical pillar at a horizontal distance of 50 mt. from its base is 45° . If the angle of elevation of the complete pillar at the same point is to be 60° , then the height of the incomplete pillar is to be increased by :
 (1) 25 mt (2) $50(\sqrt{3} - 1)$ mt (3) 50 mt (4) $50(\sqrt{3} + 1)$
34. If $b = 3$, $c = 4$, $\angle B = \frac{\pi}{3}$, then the number of triangles that may be constructed is :
 (1) 0 (2) 1 (3) 2 (4) Infinite
35. If the sides of a triangles are 7 cm, $4\sqrt{3}$ and $\sqrt{13}$ cms respectively, then the smallest angle is :
 (1) 15° (2) 30° (3) 45° (4) 60°

36. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = ?$
- (1) $\tan^{-1}\left(\frac{1}{18}\right)$ (2) $\tan^{-1}\left(\frac{17}{36}\right)$ (3) $\tan^{-1}\left(\frac{1}{2}\right)$ (4) $\left(\frac{1}{2}\right)\tan^{-1}\left(\frac{3}{5}\right)$
37. The domain of $\sin^{-1}x$ is :
- (1) $[-1, 1)$ (2) $(-\pi, \pi)$ (3) $(0, 2\pi)$ (4) $(-\infty, \infty)$
38. The equation $a \cos x + b \sin x = c$ where $|c| > \sqrt{a^2 + b^2}$ has :
- (1) no solution
(2) a unique solution
(3) two solutions
(4) an infinite number of solutions
39. If $\sin x + \sin 3x + \sin 5x = 0$, then the value of x such that $0 < x \leq \frac{\pi}{2}$ is :
- (1) $\frac{\pi}{12}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{3}$
40. If $\tan \theta \tan 2\theta = 1$, then $\theta = ?$
- (1) $n\pi + \frac{\pi}{6}$ (2) $n\pi \pm \frac{\pi}{6}$ (3) $2n\pi \pm \frac{\pi}{6}$ (4) $2n\pi + \frac{\pi}{6}$
41. In a battle 71% of the combatants lost an eye, 82% an ear, 74% an arm and 83% a leg. If $x\%$ lost all the four limbs, then the minimum value of x :
- (1) can not be determined (2) 10
(3) 71 (4) None of these
42. If sets A and B are defined as :
- $A = \{(x, y) \mid y = e^x, x \in \mathbb{R}\}$
 $B = \{(x, y) \mid y = x, x \in \mathbb{R}\}$
- Then :
- (1) $A \subset B$ (2) $B \subset A$ (3) $A \cap B = \phi$ (4) $A \cup B = A$
43. Solve the LPP :
- Maximize $Z = 2x + 3y$
Subject to $x \leq 3; y \leq 3; x + y \leq 5; x, y \geq 0$
What do you find ?
- (1) Optimal solution is at $x = 2, y = 3$; Maximum value of $Z = 12$
(2) Optimal solution is at $x = 3, y = 2$; Maximum value of $Z = 12$
(3) Optimal solution is at $x = 3, y = 2$; Maximum value of $Z = 13$
(4) Optimal solution is at $x = 2, y = 3$; Maximum value of $Z = 13$
44. Consider the LPP :
- Minimize $Z = 3x + 5y$
Subject to $x \geq 3; y \geq 1; 2x + y \geq 5$
Redundant constraint in this LPP is :
- (1) $2x + y \geq 5$ (2) $y \geq 1$ (3) $x \geq 3$ (4) None of these
45. A fair coin is tossed repeatedly. If head appears in first four tosses, then the probability of head appearing in the fifth toss is :
- (1) $\frac{1}{32}$ (2) $\frac{1}{5}$ (3) $\frac{1}{2}$ (4) $\frac{31}{32}$
46. For any two events A and B the probability that exactly one of the two events occurs, is given by :
- (1) $P(A) + P(B) - P(A \cap B)$ (2) $P(A) + P(B) - 2P(A \cap B)$
(3) $1 - P(A \cap B)$ (4) $1 - P(A \cup B)$

47. If two lines of regression of Y on X and X on Y are respectively $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$, then:
 (1) $a_1 a_2 \leq b_1 b_2$ (2) $a_1 b_2 \leq a_2 b_1$ (3) $a_1 b_2 \geq a_2 b_1$ (4) $a_1 a_2 \geq b_1 b_2$
48. If X and Y are two variables such that $SD(X + Y) \geq SD(X - Y)$ then :
 (1) $-1 \leq r(X, Y) \leq 0$ (2) $0 \leq r(X, Y) \leq 1$ (3) $r(X, Y) = 0$ (4) $r(X, Y) = \pm 1$
49. If standard deviation of $\{x_1, x_2, \dots, x_n\}$ is S, then the standard deviation of $\{1 - 2x_1, 1 - 2x_2, \dots, 1 - 2x_n\}$ is equal to
 (1) $1 - 2S$ (2) $-2S$ (3) $2S$ (4) $1 - S$
50. Karl Person's coefficient of skewness is given by :
 (1) $\frac{AM - Median}{SD}$ (2) $\frac{AM - Mode}{SD}$ (3) $\frac{Median - Mode}{SD}$ (4) $\frac{AM - Mode}{Median}$
51. How many times are the hands of a clock at right angle in a day ?
 (1) 22 (2) 24 (3) 44 (4) 48
52. Consider the statement :
 Imprisonment for 27 years made Nelson Mandela the President.
 Assumptions
 I : Only who will be imprisoned for 27 years will become the President.
 II : To become the President, imprisonment is a qualification.
 In your opinion :
 (1) Only assumption I is implicit
 (2) Only Assumption II is implicit
 (3) Either I or II is implicit
 (4) Neither I nor II is implicit
53. Consider the statement :
 $A = B \geq C \geq D = E \leq F$
 Conclusions I : $F > B$
 II : $B \geq D$
 (1) Only conclusion I follows
 (2) Only conclusion II follows
 (3) Either conclusion I or II follows
 (4) Neither conclusion I or II follows
 (5) Neither conclusion I nor II follows
54. Today is Monday, After 61 days, it will be :
 (1) Wednesday (2) Saturday (3) Tuesday (4) Thursday
55. If (i) 'A - B' means 'A is father of B'
 (ii) 'A + B' means 'A is daughter of B'
 (iii) 'A = B' means 'A is son of B'
 (iv) 'A x B' means 'A is wife of B'
 Which of the following means P is grandson of S ?
 (1) $P + Q - S$ (2) $P = Q \times S$ (3) $P \div Q \div S$ (4) $P \times Q \div S$
56. Find the missing number in the following :



- (1) 1 (2) 26 (3) 39 (4) 45

57. Which number, in the given series, is wrong ?
160, 118, 83, 65, 34, 20
(1) 83 (2) 118 (3) 34 (4) 65
58. If 18th February, 2009 is Friday, then what will be the day of 18th February, 2011 ?
(1) Sunday (2) Monday (3) Tuesday (4) Wednesday
59. Ram and Shyam start walking in opposite directions. Ram covers 6 km and Shyam 8 km. Then Ram turns right and walks 8 km and Shyam turns Left and walks 6 km. How far everyone is from the starting point ?
(1) 11 km (2) 8 km (3) 9 km (4) 10 km
60. A man starts from a point 'X' walks 3 km southwards, then he turns left and walks 6 km. In which direction is he from the starting point ?
(1) South - West (2) South - East (3) West (4) South

Direction (Q. No. 61 - 67) : In each of the following questions, four pair of words are given, out of these words one pair does not bear the common relationship which rest bear. You are required to find that **odd** pair :

61. (1) Hard - Soft (2) Pointed - Blunt (3) Sweet - Soar (4) Long - High
62. (1) Captain - Team (2) Boss - Gang
(3) Chief Minister - Cabinet (4) Artist - Troupe
63. (1) Cat - Mouse (2) Lion - Deer (3) Cow - Hen (4) Hawk - Pigeon
64. (1) Oil - Lamp (2) Water - Tap (3) Oxygen - Life (4) Power - Machine
65. (1) Dim - Bright (2) Wrong - Right (3) Shallow - Deep (4) Genuine - Real
66. (1) Lion - Roar (2) Snake - Hiss (3) Bess - Hum (4) Frog - Bleat
67. (1) Needle - Prick (2) Gun - Fire (3) Auger - Bore (4) Chisel - Carve

Direction (Q. No. 68 - 74) : The following question consist of two words that certain relationship between each other, followed by four letter pairs of words. Select the related pair that has the same relationship as the original pair of words :

68. Spring : Elasticity :: ?
(1) Person : Whims (2) Wool : Warmth
(3) Marketing : Advertising (4) Radio : Broadcast
69. Man : Mammal :: ?
(1) Liberty : Literate (2) Hail : Snow
(2) native : Inhabitant (4) Offspring : Family
70. Sin : Crime :: ?
(1) Man : Animal (2) Home : Court
(2) Morality : Legality (4) Jury : Priest
71. Cells : Cytology :: ?
(1) Worms : Ornithology (2) Insects : Entomology
(3) Diseases : Physiology (4) Tissues : Morphology
72. Sailor : Compass :: ?
(1) Student : Exam (2) Doctor : Stethoscope
(3) Pen : Officer (4) Painter : Artist
73. Horse : Hoof :: ?
(1) Man : Foot (2) Dog : Black
(3) Paise : Rupee (4) Pen : Pencil
74. Fodder : Cattle :: ?
(1) Pen : Ink (2) Ball : Stick
(3) Fruit : Juice (4) Grass : Horse

Directions (Q No. 75-77) : In each of the following questions, there is certain relationship between two given words on one side of " :: " and one word is given on the other side of it, while another word is to be selected from the given alternatives having the same relationship with the word, as the words of the given pair bear.

Choose the correct alternatives :

75. Five : Ashes :: Explosion : ?
 (1) Flame (2) Death (3) Sound (4) Debris
76. Food : Stomach :: Fuel : ?
 (1) Engine (2) Plane (3) Truck (4) Automobile
77. Malaria : Disease :: Spear : ?
 (1) Wound (2) Sword (3) Weapon (4) Death
78. If 'Lily' is called 'Lotus', 'Lotus' is called 'Rose', 'ROSE' is called 'Sunflower' and 'Sunflower' is called 'Marigold', then which will be the national flower of India ?
 (1) Lily (2) Lotus (3) Rose (4) Marigold
79. If CAT = 12 then MAN = ?
 (1) 14 (2) 24 (3) 16 (4) None of these
80. In a certain code language 'COMPUTRONE' is written as 'PMNOCTUENOR's How is 'ADVANTAGES'Written in the same code ?
 (1) IDUJLAIC (2) AVDATNSEGA (3) ADVATNSAGE (4) AVDANTSEGA
81. Hexadecimal equivalent of Octal 1217 is :
 (1) 1217 (2) 028F (3) 2297 (4) 0B17
82. Specify the output of the following C- program :

```
# include < stdio. h>
void main ( )
{
int a = 10, b = 20 ;
charx= 1,y= 0;
if (a, b, x, y)
{
printf ("EXAM");
}
}
```

 (1) AM is printed (2) EXA is printed (3) Compile error (4) None of the above
83. What is the output of the following C-program ?

```
# include < stdio. h >
void main ( )
{
char letter = 'z' ;
printf ( " \n % c", letter) ;
}
```

 (1) z (2) 90 (3) Error (4) Garbage value
84. Which of the following is not a valid library function in the C programming language ?
 (1) peek () (2) poke () (3) atoc () (4) malloc ()
85. The number of bits required to encode 30 pieces of information is
 (1) 4 (2) 5 (3) 6 (4) 7
86. Level 1 cache is a form of :
 (1) processor (2) input device (3) output device (4) memory
87. USB stands for :
 (1) Universal Standard Bus (2) Universal Serial Bus
 (3) Unified Standard Bus (4) Uniform Serial Bus

88. The contents of an 8-bit register are $|||| \quad ||||$: If the represented number is in signed - 1's complement form, the decimal equivalent of the number is :
 (1) -127 (2) 127 (3) 128 (4) -0
89. Which is the correct sequence of steps in the operation of a basic computer ?
 (1) Fetch, execute, decode (2) Fetch, decode, execute
 (3) Decode, fetch, execute (4) Execute, decode, fetch
90. The ASCII is a :
 (1) 7 bit code (2) 12 bit code (3) 4 bit code (4) 6 bit code
91. If $x = 5$ is the chord of contact of the hyperbola $x^2 - y^2 = a$, then the equation of the corresponding pair of tangents is :
 (1) $25x^2 - 16y^2 - 90x - 81 = 0$ (2) $25x^2 - 16y^2 - 90x + 81 = 0$
 (3) $25x^2 - 16y^2 + 90x + 81 = 0$ (4) $25x^2 - 16y^2 + 90x - 81 = 0$
92. The line $x = at^2$ meets the ellipse at real points, if and only if :
 (1) $|t| \leq 1$ (2) $|t| \leq 2$ (3) $|t| \geq 2$ (4) $|t| \geq 1$
93. P is a variable point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with AA' as the major axis. Then the maximum value of the area of the triangle APA' is :
 (1) $\frac{1}{2} ab$ (2) ab (3) $2ab$ (4) None of these
94. If $(a, 1)$ is the mid - point of a chord passing through the vertex of the parabola $y^2 = 4x$, then :
 (1) $2a = 1$ (2) $a = 1$ (3) $a = 2$ (4) $a^2 = 1$
95. The vertex of the parabola $y^2 + 6x - 2y + 13 = 0$ is :
 (1) $(-2m - 1)$ (2) $(-2, 1)$ (3) $(2, -1)$ (4) $(2, 1)$
96. The circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 2x - 2y - 1 = 0$:
 (1) do not intersect (2) touch internally
 (3) touch externally (4) intersect at two points
97. The circle $x^2 + y^2 - 4x - 6y - 12 = 0$ cuts an intercept on x - axis of length :
 (1) 8 (2) 6 (3) 4 (4) 2
98. The medians AD and BE of the triangle ABC with vertices A (0, b), B (0, 0) and C (a, 0) are mutually perpendicular is :
 (1) $a = b$ (2) $ab = -1$ (3) $a = \pm\sqrt{2} b$ (4) $b = \pm\sqrt{2} a$
99. The lines represented by the equation $Ax^2 + 2Bxy + Cy^2 = 0$ are perpendicular, if :
 (1) $A + B = 0$ (2) $A + C = 0$ (3) $B + C = 0$ (4) $AC = -1$
100. The orthocentre of the triangle formed by $x = 3$, $y = 4$ and $4x + 3y = 12$ is at the point :
 (1) $(3, 0)$ (2) $(0, 4)$ (3) $(\frac{3}{2}, 2)$ (4) $(3, 4)$
101. The area of the figure bounded by the curves $y = e^x$, e^{-x} and the straight line $x = 1$ is :
 (1) $e + e^{-1}$ (2) $e + e^{-1} - 2$ (3) $e + e^{-1} - 1$ (4) $e - e^{-1} + 1$
102. The sum of the digits in the unit place of all the four digit numbers formed with 2, 3, 4, 5 taken all at a time, is :
 (1) 14 (2) 42 (3) 84 (4) 336
103. The value of $\sum_{r=1}^n \frac{n!}{r!}$ is :
 (1) 2^{n-1} (2) 2^n (3) $2^n - 1$ (4) $2^{n+1} + 1$

104. The sum of n terms of $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \dots$ is
 (1) $n + 2^n - 1$ (2) $n + 2^n - 1$ (3) $n - 2^{-2} - 1$ (4) $n - 2^n - 1$
105. The fifth, tenth and fifteenth terms of a GP are p, q, r respectively. Then :
 (1) $p^2 = qr$ (2) $q^2 = pr$ (3) $r^2 = pq$ (4) $pqr = 1$
106. The sum of integers from 1 to 60 that are divisible by 2 or 3 is
 (1) 330 (2) 1230 (3) 1560 (4) 1830
107. If $s = 1 + a + a^2 + \dots$, ($a < 1$), the $a = ?$
 (1) $\frac{s}{s-1}$ (2) $\frac{s}{1-s}$ (3) $\frac{s-1}{s}$ (4) $\frac{1-s}{s}$
108. If $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots = \frac{\pi^2}{6}$, then $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$ equals :
 (1) $\frac{\pi^2}{8}$ (2) $\frac{\pi^2}{9}$ (3) $\frac{\pi^2}{12}$ (4) $\frac{\pi^2}{18}$
109. If $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in AP, then :
 (1) a, b, c are in AP (2) a, b, c are in HP
 (3) a^2, b^2, c^2 are in AP (4) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in AP
110. The position of a particle x (in metres) at a time t second is given by the relation :

$$\vec{r} = 3\hat{i} - t^2\hat{j} + 4\hat{k}$$
 The magnitude of velocity (in m/s) of the particle after 5 seconds is :
 (1) $\sqrt{102}$ (2) $\sqrt{109}$ (3) $\sqrt{110}$ (4) $\sqrt{113}$
111. A projectile is thrown with an initial velocity $\mathbf{v} = (p\hat{i} + q\hat{j})$ m/s. If the range of the projectile is double the maximum height reached by it, then :
 (1) $p = 2q$ (2) $q = 4p$ (3) $q = 2p$ (4) $q = p$
112. A body travelling along a straight line traversed one-third the distance with a velocity of 5 m/s. The remaining part of the distance was covered with velocity 3 m/s for half the time and with velocity 2 m/s for the other half of the time. The average velocity of the body over the whole time of motion will be :
 (1) 2 m/s (2) 2.5 m/s (3) 3 m/s (4) 5 m/s
113. A uniform rod rests entirely within a smooth spherical bowl. Its inclination to the horizontal is :
 (1) 0° (2) 30° (3) 35° (4) 45°
114. The semi-vertical angle of cone of friction is 30° . The co-efficient of friction is :
 (1) $\frac{1}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{2}}$ (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{1}{3}$
115. A body of weight 4 kg rests in limiting equilibrium on an inclined plane whose slope is 30° . The normal reactions and co-efficient of frictions are, respectively :
 (1) $2\sqrt{3}$ kg, $\frac{1}{\sqrt{3}}$ (2) $2\sqrt{3}$ kg, $\frac{1}{\sqrt{2}}$
 (3) $3\sqrt{2}$ kg, $\frac{1}{\sqrt{3}}$ (4) $3\sqrt{2}$ kg, $\frac{1}{\sqrt{2}}$

130. The value of $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$ is
 (1) $\frac{\sqrt{3}}{2}$ (2) 1 (3) $\sqrt{3}$ (4) 2
131. If $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$ and $C = \{2, 4\}$, then the number of elements in $(A - B) \times (B - C)$ is :
 (1) 1 (2) -2 (3) 3 (4) 4
132. In an examination, 60% candidates passed in Physics, 75% passed in Mathematics. If $x\%$ passed in both, then :
 (1) $15 \leq x \leq 60$ (2) $15 \leq x \leq 75$ (3) $35 \leq x \leq 75$ (4) $35 \leq x \leq 60$
133. A set contains n elements. The power set contains :
 (1) n elements (2) n^2 elements (3) 2^n elements (4) n^n elements
134. If A and B are two sets, then $A \cap (A \cap B)$ equals :
 (1) ϕ (2) A (3) B (4) $A \cap B$
135. Consider the following statements :
 A : The set of all feasible solutions of a LPP is called the feasible region.
 B : The set of all feasible solutions is a convex set. In your opinion :
 (1) Only A is correct (2) Only B is correct
 (3) Both A and B are correct (4) Both A and B are incorrect
136. Which of the following statements is correct ?
 (1) Every LPP admits an optimal solution.
 (2) Every LPP admits a unique optimal solution.
 (3) Every LPP admits an infinite number of optimal solutions.
 (4) If a LPP admits two optimal solutions, it has an infinite number of optimal solutions.
137. For two events A, B associated with a random experiment, $B \subset A$, then $P(A \cap B)$ is equal to :
 (1) $P(A) - P(B)$ (2) $P(A) - 1 + P(B)$ (3) $P(A) + 1 - P(B)$ (4) $P(A) - 1 - P(B)$
138. In an experiment, a coin is tossed twice. If the second toss results in a head, a die is rolled. The number of elements in the sample space is :
 (1) 9 (2) 12 (3) 14 (4) 16
139. For fitting a polynomial of K^{th} - degree, there should be :
 (1) K Normal equations in K unknowns
 (2) K Normal equations in $(K+1)$ unknowns
 (3) $K + 1$ Normal equations in $(K+1)$ unknowns.
 (4) $K + 1$ Normal equations in K unknowns
140. If G_1, G_2 are the geometric means of two series of observations and G is the geometric mean of the ratios the corresponding observations, then G is equal to :
 (1) $\frac{G_1}{G_2}$ (2) $\log G_1 - \log G_2$ (3) $\frac{\log G_1}{\log G_2}$ (4) $\log \frac{G_1}{G_2}$
141. Arithmetic Mean of 10 consecutive natural numbers is 'M', then the Arithmetics Mean of the next 10 consecutive natural numbers is :
 (1) can not be found (2) M
 (3) $M + 5$ (4) $M + 10$
142. If the coefficients of the middle terms in the expansion of $(1 + x)^{2n+2}$ is P and the coefficient of middle terms in the expansion of $(1 + x)^{2n+1}$ are q are r , then
 (1) $p = q + r$ (2) $q = p + r$ (3) $r = p + q$ (4) $2p = q + r$

143. In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^{15}$, the term independent of x is :

(1) $^{-15}C_9$

(2) 0

(3) 1

(4) $^{15}C_9$

144. If α, β, γ are the roots of the equation $x^3 + px + q = 0$ (with $p \neq 0, q \neq 0$), then the value of the determinant :

$$\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix} \text{ is :}$$

(1) 0

(2) p

(3) q

(4) $p^2 - 2q$

145. If $\begin{vmatrix} a & b & 0 \\ 0 & a & b \\ b & a & 0 \end{vmatrix} = 0$, then

(1) $a = b = -1$

(2) $a = b = 1$

(3) $\frac{a}{b}$ is a cube root of unity

(4) $\frac{a}{b}$ is a cube root of -1

146. If $3^x + 3^y = 3^{x+y}$, then the value of $\frac{dy}{dx}$ at $x = 1, y = 1$ is :

(1) -1

(2) 0

(3) 1

(4) 3

147. If $x^m y^n = (x + y)^{m+n}$, then $\frac{dy}{dx}$ is equal to :

(1) $\frac{y}{x}$

(2) $\frac{py}{qx}$

(3) $\frac{qy}{px}$

(4) $\frac{x}{y}$

148. The value of the derivative of $|x - 1| + |x - 3|$ at $x = 2$ is :

(1) can not be found

(2) -2

(3) 0

(4) 2

149. $\lim_{x \rightarrow 1} \frac{x + x^2 + \dots + x^n - n}{x - 1}$ is :

(1) 0

(2) n

(3) $\frac{n(n-1)}{2}$

(4) $\frac{n(n+1)}{2}$

150. Let $f(x) = |x|$ and $g(x) = |x^3|$, then at $x = 0$:

(1) $f(x)$ and $g(x)$ are both continuous

(2) $f(x)$ and $g(x)$ are both differentiable

(3) $f(x)$ is differentiable but $g(x)$ is not differentiable

(4) $f(x)$ is not continuous but $g(x)$ is continuous