11P/203/21

Set No: (3) Question Booklet No. 6069

(To be filled up by the candidate by ***blue/black ball-point pen***)

Roll No. | | 9 | | 1 | | 4 | 6 | 9 |

Roll No.
(Write the digits in words)

Serial No. of Answer Sheet.....

Day and Date SATURDAY 21/05/2011

.....
(*Signature of Invigilator*)

INSTRUCTIONS TO CANDIDATES

(Use only ***blue/black ball-point pen*** in the space above and on both sides of the **Answer Sheet**)

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope*.
3. A separate Answer Sheet is given. ***It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.***
4. Write your ***Roll Number and Serial Number of the Answer Sheet by pen*** in the space provided above
5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*
6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and Roll No. and OMR sheet No. on the Question Booklet.
7. Any changes in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.
8. Each question in this Booklet is followed by four alternative answers. ***For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.***
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. ***Note that the answer once filled in ink cannot be changed***. If you *do not wish to attempt* a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks)
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit ***only OMR Answer Sheet*** at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण-पृष्ठ पर दिये गए हैं]

Total No. of Printed Pages : **34**

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1. For a frequency distribution standard deviation is computed by using the formula

(a) $\sigma=\frac{\sum f(x-\bar{x})}{\sum f}$ (b) $\sigma=\frac{\sum f(x-\bar{x})^2}{\sum f}$

(c) $\sigma=\sqrt{\frac{\sum f(x-\bar{x})^2}{\sum f}}$ (d) $\sigma=\sqrt{\frac{\sum f(x-\bar{x})}{\sum f}}$ C

BHU-2011

2. Which one of the following statement is true for a given distribution ?
   (a) Mean deviation > Standard deviation
   (b) Mean deviation > Standard deviation
   (c) Mean deviation = Standard deviation
   (d) Mean deviation and Standard deviation are not related B

BHU-2011

3. In case of bionmial distribution, probability of r successes is given by
   (a) ${}^nC_r\, q^{n-r}\, p^r$ (b) ${}^nC_r\, p^{n-r}\, q^r$
   (c) ${}^nC_r\, p^{n-r}$ (d) ${}^nC_r\, q^{n-r}$ A

BHU-2011

4. The standard deviation for Poisson distribution with parameter m is
   (a) m (b) $\sqrt{m}$
   (c) $\frac{1}{m}$ (d) $\frac{1}{\sqrt{m}}$ B

BHU-2011

5. For a normal distribution, we have D
   (a) mean = median (b) median = mode
   (c) mode = mean (d) mean - median = mode

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6. The value of the correlation coefficient between two variables lies between
   (a) 0 and ∞ (b) $-\infty$ and $+\infty$
   (c) 0 and 1 (d) – 1 and 1 D

BHU-2011

7. The coefficient of regression of X and Y for the data

	Series X	Series Y
Average	25	22
S.D.	4	5

is
   (a) 1.00 (b) 0.84
   (c) 0.64 (d) 0.31 W

BHU-2011

8. In simplex, when the number of non-zero variables is equal to the number of constraints, the set of values is said to form a
   (a) Feasible solution (b) Basic solution
   (c) Iso-cost solution (d) Optimal solution

BHU-2011

9. The linear programming problem Maximine $z = 4x + y$ subject to
$3x + 5y \le 15$,
$5x + 5y \le 15$,
$-x + y \le 2$,
$4x + 5y \le 20$,
$x, y \ge 15$ has
   (a) No solution (b) one solution
   (c) Infinite solution (d) Finite solutions

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10. The resultant of two forces P, Q acting at a certain angle is X; and that of P, R acting at the same angle is also X. Then the value of P is
   (a) $\sqrt{Q^2+RX}$ (b) $\sqrt{R^2+QX}$
   (c) $\sqrt{X^2+QR}$ (d) $\sqrt{QR(Q+R)}$

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11. ABCDE is pentagon. Forces acting on a particle are represented in magnitude and direction by $\overrightarrow{AB}$, $\overrightarrow{BC}$, $\overrightarrow{CD}$, $\overrightarrow{2DE}$, $\overrightarrow{AD}$, and $\overrightarrow{AE}$. Their resultant is given by
   (a) $\overrightarrow{AE}$ (b) $\overrightarrow{2AE}$
   (c) $\overrightarrow{3AE}$ (d) $\overrightarrow{4AE}$

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12. Which one of the following is not a force
   (a) Tension (b) Attraction
   (c) Weight (d) Acceleration

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13. Two like parallel forces P and Q act on a rigid body at A and B respectively. If P and Q be interchanged in position, then the point of application of the resultant will be displaced through a distance (along AB)
   (a) $\frac{P+Q}{P-Q}AB$ (b) $\frac{P-Q}{P+Q}AB$
   (c) $(P-Q)AB$ (d) $(P+Q)AB$

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14. A beam whose centre of gravity divides it into two portions, a and b, is placed inside a smooth sphere. If θ be its inclination to the horizon in the position of equilibirium and 2α be the angle subtended by the beam at the centre of the sphere, then
   (a) $\tan\theta=(b-a)(b+a)\tan\alpha$ (b) $\tan\theta\frac{b-a}{b+a}\tan\alpha$
   (c) $\tan\theta=\frac{1}{(b-a)(b+a)}\tan\alpha$ (d) $\tan\theta\frac{b+a}{b-a}\tan\alpha$

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15. P, Q, R are the points on the sides BC, CA, AB of triangle ABC such that BP : PC = CQ : QA = AR : RB = m : n. If Δ denote the area of the triangle ABC, then the forces $\overrightarrow{AP}, \overrightarrow{BQ}, \overrightarrow{CR}$ reduce to a couple whose moment is

(a) $2\frac{m-n}{m+n}\tan\Delta$ (b) $2\frac{m+n}{m-n}\Delta$

(c) $2(m^2-n^2)\Delta$ (d) $2(m^2+n^2)\Delta$

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16. Two unlike parallel forces P and Q (P > Q), xm apart act at two points of a rigid body. If the direction of P be reversed, then the resultant is displaced through the distance

(a) 2PQxm (b) (P^2-Q^2)xm

(c) $\frac{2PQ}{P^2-Q^2}$xm (d) $\frac{2PQ}{P^2+Q^2}$xm

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17. If the resultant of two forces P and Q acting at a point at an angle α is $(2m+1)\sqrt{P^2+Q^2}$ and when they act at an angle $\left[\frac{\pi}{2}-\alpha\right)$, the resultant becomes $(2m-1)\sqrt{P^2+Q^2}$, then

(a) $\tan\alpha = \frac{1}{m+1}$ (b) $\tan\alpha = \frac{1}{m-1}$

(c) $\tan\alpha = \frac{m+1}{m-1}$ (d) $\tan\alpha = \frac{m-1}{m+1}$

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18. To a man walking at 2 km/hr the rain appears to fall vertically when he increases his speed to 4 km/hr it appears to meet him at an angle of 45°. Then the actual velocity of rain is

(a) $\sqrt{2}$ km/hr (b) $\sqrt{3}$ km/hr

(c) $2\sqrt{2}$ km/hr (d) $2\sqrt{3}$ km/hr

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19. Accèleation of a moving point is

(a) Tension (b) Attraction

(c) Weight (d) Acceleration B

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20. If a body is falling freely under gravity, then the acceleration

(a) Is zero (b) Is uniform

(c) Varies as the square of the distance travelled

(d) Varies as the inverse of the distance travelled

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21. A point moves with uniform acceleration and v_1, v_2, v_3, denote the average velocities in three successive intervals of time t_1, t_2, t_3, then

(a) $\frac{v_1-v_2}{v_2-v_3}=\frac{t_1+t_2}{t_2+t_3}$ (b) $\frac{v_1+v_2}{v_2+v_3}=\frac{t_1+t_2}{t_2+t_3}$

(c) $\frac{v_1+v_2}{v_2+v_3}=\frac{t_1-t_2}{t_2-t_3}$ (d) $\frac{v_1-v_2}{v_2-v_3}=\frac{t_1-t_2}{t_2-t_3}$

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22. A mass m is acted upon by a constant force P lb. wt. under which in t sec it moves a distance of x feet and acquires a velocity v ft/sec. Then x is equal to

(a) $\frac{gP}{2mt^2}$ (b) $\frac{mg}{2v^2P}$

(c) $\frac{gt^2}{2Pm}$ (d) $\frac{mv^2}{2gP}$

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23. Masses of 5 kg and 3 kg rst on two inclined planes each of 30° and are connected by a string passing over the common vertex. After 2 seconds the mass of 5 kg is removed. How far up the plane will the 3 kg mass continue to move ?

(a) $\frac{2}{3}$m (b) $\frac{3}{5}$m

(c) $\frac{4}{7}$m (d) $\frac{5}{8}$m

BHU-2011

24. The time of flight of a particle, which is projected with velocity u in a direction making an angle α, is given by

(a) 2 ug sinα (b) 2 ug cosα

(c) $\frac{2\,ug\sin\alpha}{g}$ (d) $\frac{2\,ug\cos\alpha}{g}$

BHU-2011

25. If a particle is projected with a velocity u at an angle α = 45°, then

(a) The range is minimum

(b) The range is maximum

(c) The range is maximum and equals $\frac{u^2}{2g}$

(d) The time to the highest point is $\frac{u}{g\sqrt{2}}$

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Direction :

(Question Nos. 26-30) : Data on the candidates, who took an examination in Social Sciences, Mathematics and Science are given below :

Passed in all Subjects	167
Failed in all Subjects	60
Failed in Social Sciences	175
Failed in Mathematics	199
Failed in Science	191
Passed in Social Sciences only	62
Passed in Mathematics only	48
Passed in Science only	52

Answer the following questions based on above data : **BHU-2011**

26. How many failed in one subject only ?
(a) 56 (b) 61
(c) 144 (d) 152

27. How many failed in two subject only ?
(a) 56 (b) 61
(c) 144 (d) 162

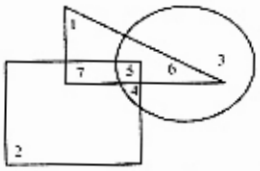
28. How many failed in Social Science only ?
(a) 15 (b) 21
(c) 30 (d) 42

29. How many passed at least in one subject ?
(a) 167 (b) 304
(c) 390 (d) 450

30. How many passed Mathematics and at least in one more subject ?
(a) 94 (b) 170
(c) 203 (d) 210

Direction :

(Question Nos. 31-33) : These questions are based on the diagram given below. In the diagram, the triangle stands for graduates, square for membership of professional organisations and the circle for membership of social organisations. Read each statement and find out the appropriate numbers to represent the people covered by statement : **BHU-2011**

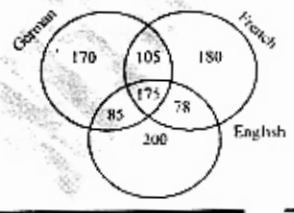


31. Number of graduates in social organizations is represented by
(a) 1 (b) 5 (c) 6 (d) 5 and 6 D

32. Number of graduates in social organizations only is represented by
(a) 3 (b) 4 (c) 5 (d) 6 D

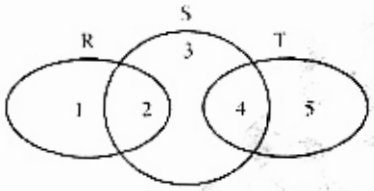
33. Number of graduates in preofessional organizations is represented by
(a) 5 and 7 (b) 4, 5 and 6
(c) 6 and 7 (d) 5, 6 and 7 A

34. A survey was conducted on a sample of 1000 persons with reference to their knowledge of English, French and Germen. The result is presented in the Venn diagram. The ratio of the number of persons who do not know the three languages to those who know all the three languages is



(a) 1/27 (b) 1/25
(c) 1/550 (d) 175/1000 B

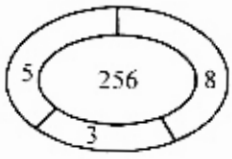
35. The following diagram, R represents businessmen, S represents rich men, T represents honest men. Which number will represent honest rich men ?



(a) 2 (b) 3
(c) 5 (d) 4 D

Direction :

(Question Nos. 36-40) : Which number should come in place of question mark (?) in the following questions :



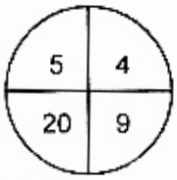
(a) 8 (b) 7
(c) 6 (d) 4 C

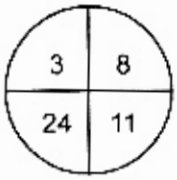
36. How many failed in one subject only ?
(a) 56 (b) 61
(c) 144 (d) 152
BHU-2011

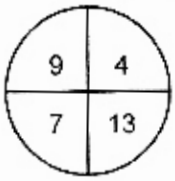
37.
(a) 12 (b) 26
(c) 16 (d) 20
BHU-2011

38.
(a) 12 (b) 26
(c) 16 (d) 20
BHU-2011

39.







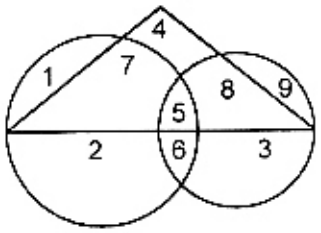
(a) 26 (b) 36
(c) 52 (d) 117 B
BHU-2011

40.

(a) 729 (b) 343
(c) 305 (d) 4 B
BHU-2011

Directions :

Question Nos. 41-45 The following five questions are based on the following diagram in which the triangle represents female graduates, small circle represents self-emplloyed females and the big circle represents self-employed females with bank loan facility. Numbers are shown in the different sections of the diagram. On the basis of these numbers, answer the following :



41. How many female graduates are self-employed ?
(a) 12 (b) 13
(c) 15 (d) 20 D
BHU-2011

42. How many female graduates are not self-employed ?
(a) 4 (b) 11
(c) 10 (d) 15 A
BHU-2011

43. How many non-graduates female are self-employed ?
(a) 9 (b) 11
(c) 12 (d) 21 D
BHU-2011

44. How many self-employed female graduates are with bank loan facility ?
(a) 5 (b) 7
(c) 12 (d) 20 C
BHU-2011

45. How many non-graduates self-employed female are with bank loan facility ?
(a) 3 (b) 8
(c) 9 (d) 12 A
BHU-2011

46. If PERILOUS is written as RGTKNQWU in a code language then how will OLYMPIC be written in that language ?
(a) QNOAKRE (b) QONARKE
(c) QNAORKE (d) QKNOARE C
BHU-2011

47. If 'MASTER' is written in as '412536' and 'SERVANT' is written as '2367185' then how will 'REVERENT' be written in the same code language ?
(a) 63736385 (b) 36733685
(c) 85336538 (d) 63536385 A
BHU-2011

48. If the code word of BOMBAY in a certain code is 58 then, what will be the code word for TROMBAY ?
(a) 89 (b) 94
(c) 95 (d) 84 B
BHU-2011

49. In a certain code language 'MT' is coded as 'I am happy'. 'CTR' as 'That black happy' and 'NPS' - 'I very happily'. Then which word is used for 'am' ?
(a) M (b) T
(c) P (d) C A
BHU-2011

50. If CAT is coded as TC then how will sun be coded?
(a) UN (b) NU
(c) US (d) NS D
BHU-2011

51. In the following series, find the term in place of question mark (?) 3, 8, 27, 112, 565 ?
(a) 3400 (b) 3396
(c) 1596 (d) 2266 B
BHU-2011

52. In the following number series one number is wrong. Find out the wrong number -
9, 15, 22, 30, 40, 90, 60
(a) 15 (b) 30
(c) 40 (d) 49 C
BHU-2011

53. In the following a missing term is to be find out (?)
DKM, FJP, HIS, JHV, ?
(a) HGY (b) IGZ
(c) IGY (d) IGY D
BHU-2011

54. Letters of which of the alternative answers when placed at the blank places on after another will complete the given letter-series?
a — bbc — aab — cca — bbcc
(a) acba (b) bacb
(c) caba (d) abba
BHU-2011

55. In the following question a number-series is given. Which one of the alternatives will replace the question mark (?) ? 4, 9, 19, 39, 79, —?
(a) 169 (b) 159
(c) 119 (d) 139 B
BHU-2011

56. The headquarters of the World Health Organization is located at : ?
(a) Paris (b) Geneva
(c) Peru (d) Chicago B
BHU-2011

57. Who was the first Indian to be the President of U.N. General Assembly ?
(a) Natwar Singh (b) Ramesh Bhandari
(c) Smt. Vijai L. Pandit (d) Pandit J.L. Nehru
BHU-2011

58. Marketing of agricultural produce in India is through :
(a) Co-operatives (b) Businessmen
(c) Government (d) Individuals
BHU-2011

59. The first railway line was laid in India in :
(a) 1836 (b) 1803
(c) 1853 (d) 1860
BHU-2011

60. The Vikram Sarabhai Space Centre is located at
(a) Sriharikota (b) Trivandram
(c) Trombay (d) Bangalore
BHU-2011

Directions :
Question Nos. 61-62 : In the following questions, choose the word, which is most nearly the same in meaning to the **bold** word and mark it in the Answer Sheet.

61. His style is quite **transparent**.
(a) verbose (b) Involved
(c) Lucid (d) Witty C
BHU-2011

62. **High.**
(a) Tall (b) Short
(c) Thin (d) Fat A
BHU-2011

Directions :
Question Nos. 63-64 : In the following questions, choose the word, which is most nearly the OPPOSITE in meaning to the **bold** word and mark it in the Answer Sheet.

63. Lucy is a **smart** girl.
(a) Active (b) Indecent
(c) Casual (d) Lazy
BHU-2011

65. In the following questions, the first and the last part of the sentence are numbered 1 and 6. The rest of the sentence is split up into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the sentence and find out which part of the four combinations is correct. Then find the correct answer and indicate it in the Answer Sheet :
1 : Religion has been used
P : both as a weapon of isolation
Q : to dull awareness
R : about real problems
S : and as morphia
6 : like education, health and employment.
(a) PQRS (b) PSQR
(c) QPSR (d) RPQS
BHU-2011

66. The heart and the nerve centre of a computer is its
(a) Output unit (b) Input unit
(c) C.P.U. (d) Memory C
BHU-2011

67. Main memory unit of a computer
(a) Performs arithmetic
(b) Stores a small amount of data and instructions
(c) Stores bulk of data and instructions
(d) Supervises the working of all the unit B
BHU-2011

68. The modern digital computer uses
(a) Decimal system (b) Octal system
(c) Binary system (d) All of these C
BHU-2011

69. The base of the binary number system is
(a) 2 (b) 16
(c) 8 (d) 10 A
BHU-2011

70. Ten data items are to be read in a problem. The control structure needed is
(a) Selection or repetition (b) Only sequential
(c) Only selection
(d) Sequential or repetition
BHU-2011

71. C is a
(a) High level language (b) Low level language
(c) High level language with some low level features
(d) Machine language C
BHU-2011

72. Which of the following codes uses 7 bits to represent a character ?
(a) Output unit (b) Input unit
(c) C.P.U. (d) Memory C
BHU-2011

73. The Boolean expression X + X'Y equals
(a) X + Y (b) X + XY
(c) Y + YX (d) X'Y + Y'X A
BHU-2011

74. Let A be a set having n element. The number of binary operations that can be defined on A is
(a) z^{n^n} (b) n^{n^2}
(c) n^{z^n} (d) z^{z^n}
BHU-2011

75. The Boolean expression (A + C) (AB' + AC) (A'C' + B') can be simplified to
(a) AB + A'C (b) A'B + BC
(c) AB + BC (d) AB
BHU-2011

76. The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is
(a) 2 (b) 4
(c) 6 (d) 8 B
BHU-2011

77. The number of quadratic equations which remain unchanged by squaring their roots, is
(a) Zero (b) Four
(c) Two (d) Infinite
BHU-2011

78. The nth term of the series
$2\frac{1}{2} + 1\frac{7}{13} + 1\frac{1}{9} + \frac{20}{23} + \ldots$ is
(a) $\frac{20}{5n+3}$ (b) $\frac{2}{5n-3}$
(c) $20(5n+3)$ (d) $\frac{20}{5n^2+3}$ A
BHU-2011

79. The coefficient of x^{15} the product
$(x-1)(2x-1)(2^2x-1)(2^3x-1)\ldots(2^{15}x-1)$
is euqal to
(a) $2^{120}-2^{108}$ (b) $2^{105}-2^{121}$
(c) $2^{120}-2^{105}$ (d) $2^{120}-2^{104}$ A
BHU-2011

80. The value of $\sum_{p=1}^{6} 2\left(\sin\frac{2p\pi}{7} - i\cos\frac{2p\pi}{7}\right)$ is
(a) 1 (b) 2
(c) 2 (d) $-2i$
BHU-2011

81. If 1, ω, ω^2, ... ω^{n-1} are nth roots of unity, then $(1-\omega)(1-\omega^2)\ldots(1-\omega^{n-1})$ is equal to
(a) n^2 (b) 0
(c) 1 (d) n C
BHU-2011

82. The number of subsets of a set containing n distinct object is
(a) ${}^nC_1+{}^nC_2+{}^nC_3+{}^nC_4+\ldots+{}^nC_n$ (b) 2^n-1
(c) 2^n+1 (d) ${}^nC_0+{}^nC_1+{}^nC_2+\ldots+{}^nC_n$ D
BHU-2011

83. There are n numbered seats around a round table. Total number of ways in which n_1 ($n_1<n$) persons can sit around the round table, is equal to
(a) ${}^nC_{n_1}$ (b) ${}^nP_{n_1}$
(c) ${}^nC_{n_1+1}$ (d) ${}^nP_{n_1-1}$
BHU-2011

84. If the coefficient of x7 in the expansion of $\left(px^2+\frac{1}{qx}\right)^{11}$ is equal to the coefficient of x^{-7} in the expansion of $\left(px-\frac{1}{qx^2}\right)^{11}$, then
(a) pq = 1 (b) (p/q) = 1
(c) p + q = 1 (d) p - q = 1
BHU-2011

85. In the bionomial expansion of $(a-b)^n$, $n \le 5$, the sum of the 5th and 6th terms is zero. Then (a/b) equals
(a) (n - 4) / 5 (b) (n - 5) / 6
(c) 5 / (n - 4) (d) 6 / (n - 5)
BHU-2011

86. If $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, where x, y, z are unequal and non-zero real numbers, then xyz is equal to
(a) 1 (b) 2
(c) –1 (d) –2 C
BHU-2011

87. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 3 \\ 1 & -5 \\ 4 & 1 \end{bmatrix}$, then AB is equal to
(a) $\begin{bmatrix} -3 & -1 \\ -9 & -3 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & -1 \\ 9 & -3 \end{bmatrix}$
(c) $\begin{bmatrix} -3 & 1 \\ 9 & 3 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 1 \\ -9 & 3 \end{bmatrix}$ B
BHU-2011

88. If $A = \begin{bmatrix} 1 & -2 & -3 \\ 2 & 1 & -2 \\ 3 & 2 & 1 \end{bmatrix}$, then A is
(a) Symmetric matrix (b) A skew symmetric matrix
(c) A singular matrix (d) Non-singular matrix D
BHU-2011

89. If $x = \frac{1}{2}(\sqrt{3}+1)$, then the value of expression $4x^5+2x-8x+7$ equal to
(a) 10 (b) 5
(c) 0 (d) -2
BHU-2011

90. If the ratio of the sum of m terms and n terms of an A.P. be $m^2 : n^2$, then its ratio of its mth and nth terms will be
(a) $\frac{m-n}{m+n}$ (b) $\frac{2m-1}{2n-1}$
(c) $\frac{2m+1}{2n+1}$ (d) $\frac{m+n}{m-n}$ B
BHU-2011

91. If in a G.P. sum of n terms is 255, the last term is 128 and the common ratio is 2, then the value of n is equal to
(a) 2 (b) 4
(c) 8 (d) 16
BHU-2011

92. The value of $7\log(16/15) + 5\log(25/24) + 3\log(81/80)$ is equal to
(a) 0 (b) log 2
(c) log 3 (d) log 5 B
BHU-2011

93. If A = {a, b, d, l}, B = {c, d, f, m} and {a, l, m, o}, then C $\cap$ (A $\cup$ B) is given by
(a) {a, d, l, m} (b) {b, c, f, o}
(c) {a, l, m} (d) {a, b, c, d, f, l, m, o} C
BHU-2011

94. The number of subsets of an n elementric set is
(a) 2n (b) n
(c) 2^n (d) $\frac{1}{2}2^n$ C
BHU-2011

95. If A = {1, 2, 3}, B = {4, 5, 6}, which of the following are relations from A to B?
(a) {(1, 5), (2, 6), (3, 4), (3, 6)}
(b) {(1, 6), (3, 4), (5, 2)}
(c) {(4, 2), (4, 3), (5, 1)} (d) B x A A
BHU-2011

96. If f = {(1, 1), (2, 3), (0, −1), (−1, −3)} be a function described by the formula f(x) = ax + b for some integers a, b, then the value of a, b is
(a) a = − 1, b = 3 (b) a = 3, b = 1
(c) a = − 1, b = 2 (d) a = 2, b = −1 D
BHU-2011

97. A straight line passes through the pont P (2, √3) and makes an angle of 60° with the x-axis. The lenght of the intercept on it between the point P and the line $x+\sqrt{3}y = 12$
(a) 1.5 (b) 2.5
(c) 3.5 (d) 4.5 C
BHU-2011

98. The co-ordinates of the orthocentre of the triangle formed by the lines $2x^2 - 2y^2 + 3xy + 3x + y + 1 = 0$ and $3x + 2y + 1 = 0$ are
(a) $\left(\frac{4}{5}, \frac{3}{5}\right)$ (b) $\left(\frac{-3}{5}, \frac{-1}{5}\right)$
(c) $\left(\frac{1}{5}, \frac{4}{5}\right)$ (d) $\left(\frac{2}{5}, \frac{1}{5}\right)$ B
BHU-2011

99. The equation $\sqrt{(x^2+4y^2-4xy+4)}+x-2y=1$ represents a
(a) Straight line (b) Circle
(c) Parabola (d) Pair of lines A
BHU-2011

100. Two circles $x^2 + y^2 = 5$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through their point of intersection and the point (1, 1) is
(a) $x^2 + y^2 - 6x + 4 = 0$ (b) $x^2 + y^2 - 3x + 1 = 0$
(c) $x^2 + y^2 - 4x + 2 = 0$ (d) $x^2 + y^2 - 5x + 3 = 0$
BHU-2011

101. An equilateral triangle is inscribed in a parabola $y^2 = 4ax$ whose vertex is at the vertex of the parabola. The lenght of its side is
(a) $a\sqrt{3}$ (b) $2a\sqrt{3}$
(c) $8a\sqrt{3}$ (d) $4a\sqrt{3}$ D
BHU-2011

102. If in ellipse the lenght of latus rectum is equal to half of major axis, then eccentricity of the ellopse is
(a) $\sqrt{3}/2$ (b) 1/2
(c) $\sqrt{2}$ (d) $1/\sqrt{3}$
BHU-2011

103. The difference of th focal distances of any point on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is
(a) a (b) 2a
(c) b (d) 2b B
BHU-2011

104. Every homogeneous equation of second degree in x and y represent a pair of lines
(a) Parallel to x-axis (b) Perpendicular to y-axis
(c) $8a\sqrt{3}$ (d) Parallel to y-axis C
BHU-2011

105. The value of $\lim_{x\to -2}\frac{\tan \pi x}{x+2}+\lim_{t\to \infty}\left(1+\frac{1}{x^2}\right)^x$ is equal to
(a) π + 1 (b) π - 1
(c) π (d) 3 A
BHU-2011

106. If $f(x)=\begin{cases} 0 & at \quad x=0 \\ \frac{1}{2}-x+[x] & if \quad 0<x<\frac{1}{2} \\ \frac{1}{2} & if \quad x=\frac{1}{2} \\ \frac{2}{3}-x & if \quad \frac{1}{2}<x<1 \\ 1 & if \quad x=1 \end{cases}$ then $f(x)$ is
(a) Continuous at x = ½ (b) Continuous at x = 1
(c) Continuous at x = 0 (d) Discontinuous at x = 0
BHU-2011

107. The derivative of $\sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is
(a) −1 (b) 0
(c) 1/x (d) x A
BHU-2011

108. The differential coefficient of x^x is
(a) $x^x \log x$ (b) $x^x\left(\log x+\frac{1}{x}\right)$
(c) $x^x(\log x + 1)$ (d) $x\,x^{x-1}$ C
BHU-2011

109. The straight line $\frac{x}{a}+\frac{y}{b}=1$ touches the curve $y = be^{-x/a}$ at the point
(a) where it crosses the y-axis
(b) where it crosses the x-axis
(c) (0, 0) (d) (1, 1) A
BHU-2011

110. The equation of tangent to the curce $y^2 = 2x^3 - x^2 + 3$ at the point (1, 4) is

(a) $y = 2x$ (b) $x = 2y$

(c) $y = 4x$ (d) $x = 4y$ C

BHU-2011

111. The length of the normal at the point (2, 4) to the parabola $y^2 = 8x$ is

(a) $4\sqrt{2}$ (b) 4

(c) $\sqrt{6}$ (d) $2\sqrt{3}$

BHU-2011

112. The normal to the curve $x = a(\cos\theta + \theta \sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$ at any point θ is such that it

(a) Passes through the origin

(b) Makes a constant angle with the x-axis

(c) Makes a constant angle with the y-axis

(d) Is at constant distance from the origin

BHU-2011

113. The function $f(x) = \sin x (1 + \cos x)$ has a maximum value when

(a) $x = \frac{1}{2}\pi$ (b) $\frac{1}{3}\pi$

(c) $\frac{1}{4}\pi$ (d) $\frac{1}{5}\pi$ B

BHU-2011

114. The equation of tangent to the curce $y^2 = 2x^3 - x^2 + 3$ at the point (1, 4) is

(a) $x = -\frac{1}{2}$ (b) $x = \frac{1}{2}$

(c) $x = 1$ (d) $x = -1$ B

BHU-2011

115. The value of $\int \log x\, dx$ is

(a) $x(\log x + 1)$ (b) $x(\log x - 1)$

(c) $\log x(x + \log x)$ (d) $x(x - \log x)$ B

BHU-2011

116. The value of $\int \frac{\tan^{-1} x}{1+x^2} dx$ is

(a) $e^{\tan^{-1}x}$ (b) $e^{-\tan^{-1}x}$

(c) $\frac{1}{1+x^2}$ (d) $-\frac{1}{1+x^2}$

BHU-2011

117. The value of $\int \frac{x-1}{(x-2)(x-3)} dx$ is

(a) $2\log(x-2) + \log(x-3)$

(b) $\log(x-2) - \log(x-3)$

(c) $\log(x-2) - \log(x-3)$

(d) $-\log(x-2) + 2\log(x-3)$ D

BHU-2011

118. The value of $\int_0^{\pi/4} \frac{\sin\theta + \cos\theta}{9 + 16\sin 2\theta} d\theta$ is

(a) $\frac{1}{2}\log 2$ (b) $\frac{1}{20}\log 5$

(c) $\frac{1}{20}\log 3$ (d) $\frac{1}{30}\log 7$

BHU-2011

119. The volume of a right circular cylinder of height h and radius of base 4 is

(a) $\frac{1}{3}\pi r^2 h$ (b) $\pi r^2 h$

(c) $\frac{4}{3}\pi r^2 h$ (d) $\frac{1}{2}\pi r^2 h$

BHU-2011

120. If l denoted slant height r_1 and r_2 denote the radii of the frustum of cone, then curved surface of cone is

(a) $\pi l(r_1 + r_2)$ (b) $\frac{1}{2}\pi l(r_1 - r_2)$

(c) $x = 1$ (d) $\pi r_1 r_2 [l + (l^2 + r_1 r_2)$

BHU-2011

121. The degree of the differential equation

$$\left[3 + 4\left(\frac{dy}{dx}\right)^2 + 5\left(\frac{d^2y}{dx^2}\right)\right]^{2/3} = \left(\frac{d^3y}{dx^3}\right)^2 \text{ is}$$

(a) 3 (b) 4

(c) 5 (d) 6 D

BHU-2011

122. The particular integral of the differential equation $(D^2 - 2D + 1)y = xe^x \sin x$ is given by

(a) $e^x \sin(x + 1)$ (b) $x(e^x \cos x + \sin x)$

(c) $e^x(x\cos x + \sin x)$ (d) $-e^x(x\sin x + 2\cos x)$

BHU-2011

123. The value of $\frac{1}{(D-3)(D-2)} e^{2x}$ is

(a) $x e^{2x}$ (b) $2x e^{2x}$

(c) $-x e^{2x}$ (d) $-2x e^{2x}$ D

BHU-2011

124. Solution of the differential equaion

$(1 + y^2) dx + (x - e^{-\tan^{-1} y}) dy = 0$ is

(a) $y e^{\tan^{-1}x} = \tan^{-1} x + c$ (b) $x e^{\tan^{-1}y} = \tan^{-1} y + c$

(c) $y = \tan^{-1} x\, e^{\tan^{-1}x} + c$ (d) $y = x e^{-\tan^{-1}x} + c$ B

BHU-2011

125. Let the vectors $\vec{a}, \vec{b}, \vec{c}$ be the position vectors of the vertices P, Q, R of a triangle respectively. Which of the following represents the area of the triangle ?

(a) $\frac{1}{2}\left|\vec{a} \times \vec{b}\right|$ (b) $\frac{1}{2}\left|\vec{b} \times \vec{c}\right|$ (c) $\frac{1}{2}\left|\vec{c} \times \vec{a}\right|$

(d) $\frac{1}{2}\left|\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}\right|$ D

BHU-2011

126. If $\vec{a}$ and $\vec{b}$ represent two adjacent sides $\overrightarrow{AB}$ and $\overrightarrow{BC}$ respectively of a parallelogram ABCD, then its diagonals $\overrightarrow{AC}$ and $\overrightarrow{DB}$ are equal to

(a) $\vec{a}+\vec{b}$ & $\vec{a}-\vec{b}$ (b) $\vec{a}-\vec{b}$ & $\vec{a}+\vec{b}$

(c) $\vec{a}+2\vec{b}$ & $\vec{a}-2\vec{b}$ (d) $2\vec{a}+\vec{b}$ & $2\vec{a}-\vec{b}$ A

BHU-2011

127. Let ABCD be a parallelogram. If $\vec{a}$, $\vec{b}$, $\vec{c}$ be the position vectors of A, B, C respectively with reference to the origin O, then the position vector of D with reference to O is

(a) $\vec{a}+\vec{b}+\vec{c}$ (b) $\vec{b}+\vec{c}-\vec{a}$

(c) $\vec{c}+\vec{a}-\vec{b}$ (d) $\vec{a}+\vec{b}-\vec{c}$ D

BHU-2011

128. If two vectors $\vec{a}$ and $\vec{b}$ are parallel and have equal magnitudes, then

(a) They are not equal
(b) They may or may not be equal
(c) They have the same sense of direction
(d) They do not have the same direction B

BHU-2011

129. If $\vec{a}$ and $\vec{b}$ are two unit vectors and θ is the angle between them. Then $\vec{a}+\vec{b}$ is a unit vector if

(a) $\theta=\frac{\pi}{3}$ (b) $\theta=\frac{\pi}{4}$

(c) $\theta=\frac{\pi}{2}$ (d) $\theta=\frac{2\pi}{3}$

BHU-2011

130. If the position vectors of A and B are $\vec{a}$ and $\vec{b}$ respectively, then the position vector of a point P which divides AB in the ratio 1:2 is

(a) $\frac{\vec{a}+\vec{b}}{3}$ (b) $\frac{\vec{b}+2\vec{a}}{3}$

(c) $\frac{\vec{b}+2\vec{a}}{3}$ (d) $\frac{\vec{b}-2\vec{a}}{3}$ B

BHU-2011

131. Point A is $\vec{a}+2\vec{b}$, P is $\vec{a}$ and P divides AB in the ratio 2:3. The position vector of B is

(a) $2\vec{a}-\vec{b}$ (b) $\vec{b}-2\vec{a}$

(c) $\vec{a}-3\vec{b}$ (d) $\vec{b}$ C

BHU-2011

132. $\vec{a}\cdot\vec{b}$ implies only

(a) $\vec{a}=0$ (b) $\vec{b}=0$

(c) $\theta=90°$

(d) either $\vec{a}=0$ or $\vec{b}=0$ or $\theta=90°$

BHU-2011

133. If θ be the angle between the vecots $4\left(\hat{i}-\hat{k}\right)$ and $\hat{i}+\hat{j}+\hat{k}$, then θ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$ (d) $\cos^{-1}\left(1/\sqrt{3}\right)$ A

BHU-2011

134. If $[\vec{a}\ \vec{b}\ \vec{c}]$ is the scalar triple product of three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$, then $[\vec{a}\ \vec{b}\ \vec{c}]$ is equal to

(a) $[\vec{b}\ \vec{a}\ \vec{c}]$ (b) $[\vec{c}\ \vec{b}\ \vec{a}]$

(c) $[\vec{b}\ \vec{c}\ \vec{a}]$ (d) $[\vec{a}\ \vec{c}\ \vec{b}]$ C

BHU-2011

135. If θ is the angle between vectors $\vec{a}$ and $\vec{b}$, then $\left|\vec{a}\times\vec{b}\right|=\left|\vec{a}\cdot\vec{b}\right|$ when θ is equal to

(a) 0 (b) 45°
(c) 135° (d) 180°

BHU-2011

136. If $\vec{a}=4\hat{i}+2\hat{j}-4\hat{k}$, $\vec{b}=-12\hat{i}-6\hat{j}+15\hat{k}$, then the vectors $\vec{a}$, $\vec{b}$ are

(a) Parallel (b) Non-parallel
(c) Orthogonal (d) Non-coplanar

BHU-2011

137. If the position vectors of three points are $\vec{a}-2\vec{b}+3\vec{c}, -2\vec{a}+3\vec{b}-4\vec{c}, -7\vec{b}+10\vec{c}$, then the three points are

(a) Collinear (b) Coplanar
(c) Non-coplanar (d) Neither

BHU-2011

138. If $\vec{A}=2\hat{i}+2\hat{j}-\hat{k}$, $\vec{B}=6\hat{i}-3\hat{j}+2\hat{k}$, then $\vec{A}\times\vec{B}$ will be given by

(a) $2\hat{i}-2\hat{j}-\hat{k}$ (b) $6\hat{i}-3\hat{j}+2\hat{k}$

(c) $\hat{i}-10\hat{j}-18\hat{k}$ (d) $\hat{i}+\hat{j}+\hat{k}$

BHU-2011

139. If $If\ |\vec{a}|=|\vec{b}|, then(\vec{a}+\vec{b}).(\vec{a}-\vec{b})$ is

(a) + tive (b) – tive

(c) . unity (d) Zero

BHU-2011

140. The vector $2\hat{i}+\hat{j}-\hat{k}$ is perpendicular to $\hat{i}-4\hat{j}+\lambda\hat{k}$, if λ is equal to

(a) 0 (b) – 1

(c) – 2 (d) – 3

BHU-2011

141. The value of cos 10° – sin 10° is

(a) Positive (b) Negative

(c) 0 (d) 1

BHU-2011

142. If sin α = sin β, then the angle α and β are related by

(a) $\alpha=2n\pi+(-1)^n\beta$ (b) $\alpha=n\pi\pm\alpha$

(c) $\beta=n\pi+(-1)^n\alpha$ (d) $\beta=(2n+1)\pi+\alpha$

BHU-2011

143. The value of $\frac{1-\tan^2 15°}{1+\tan^2 15°}$ is

(a) $\sqrt{3}$ (b) $\frac{\sqrt{3}}{2}$

(c) 1 (d) 2

BHU-2011

144. The general solution of the trigonometrical equation sin x + cos x = 1 is given by

(a) $x=2n\pi, n=0\pm1,\pm2,..$

(b) $x=2n\pi+\frac{\pi}{2}, n=0\pm1,\pm2,...$

(c) $x=n\pi+(-1)^n\frac{\pi}{4}-\frac{\pi}{4}, n=0\pm1,\pm2....$

(d) $x=n\pi+(-1)^n\frac{\pi}{4}, n=0\pm1,\pm2,...$

BHU-2011

145. From the top of a lighthouse 60 metres high with its base at the sea-level, the angle of depression of a boat is 15°/ The distance of the boat from the foot of the lighthouse is

(a) $\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)60 metres$ (b) $\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)60 metres$

(c) $\frac{\sqrt{3}+1}{\sqrt{3}-1} metres$ (d) $\frac{\sqrt{3}-1}{\sqrt{3}+1} metres$

BHU-2011

146. If $\sin a=-\frac{3}{5}\left(\pi<\alpha<\frac{3}{2}\pi\right)$, then the value of $\cos\frac{1}{2}\alpha$ is

(a) $-\frac{1}{\sqrt{10}}$ (b) $\frac{1}{\sqrt{10}}$

(c) $\frac{3}{\sqrt{10}}$ (d) $\frac{7}{\sqrt{10}}$

BHU-2011

147. The value of tan 9° - tan 27° - tan 63° + tan 81° is

(a) 1 (b) 2

(c) 3 (d) 4

BHU-2011

148. In a Δ ABC,

cosec A (Sin B cos C + Cos B sin C) equals

(a) $\frac{c}{a}$ (b) $\frac{a}{c}$

(c) 1 (d) 0

BHU-2011

149. Three coins are thrown together. The probability of getting two or more heade is

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{2}{3}$ (d) $\frac{3}{8}$

BHU-2011

150. The average of n numbers $x_1, x_2, x_3, ..., x_n$ is A. If x_n is replaced by $(n+1)x_n$, then the new average is

(a) $\frac{(n-1)A+nx_n}{n}$ (b) $\frac{nA+(n+1)x_n}{n}$

(c) $\frac{(n+1)A+nx_n}{n}$ (d) $A+x_n$

BHU-2011