OPENDET - X : Entrance Test for Engineering Diploma Programmes May, 2008

Total No. of Questions = 100 *Time : 2 Hours*

— All questions are compulsory.

— Use of calculator is ***not*** allowed. Rough work may be done in the space provided at the end of the Test booklet.

— The Test booklet has the following four tests :

Test I	Mathematics	No. of Questions 40
Test II	Physics	No. of Questions 20
Test III	Chemistry	No. of Questions 20
Test IV	General Awareness and Communication Skills	No. of Questions 20

Read the instructions given on the OMR Answer Sheet carefully before you start.

HOW TO FILL UP THE INFORMATION ON THE ENTRANCE TEST OMR ANSWER SHEET

While filling up the OMR Answer Sheet, you should follow the following guidelines :

1. Write your complete Roll Number. This should correspond to the roll number already supplied to you. Also write your correct name, address with pin code in the space provided, in ink. Put your signatures on the Answer Sheet with date, in ink. Ensure that the Invigilator in your examination hall also puts his signatures with date on the OMR Answer Sheet at the space provided. You should use HB pencil to mark the answers of the questions on the OMR Answer Sheet.

2. Do not make any stray marks on the OMR Answer Sheet.

3. Write correct information in numerical digits in Roll No., Programme Code, Date and Month and Examination Centre Code Columns. **The column of Course Code should be left blank.** The corresponding circle should be dark enough and should be filled in completely.

4. Each question is followed by four probable answers which are numbered 1, 2, 3 and 4. You should select and show only one answer to each question considered by you as the most appropriate or the correct answer. Select the most appropriate answer. Then by using HB pencil, blacken the circle bearing the correct answer number against the serial number of the question. **If you find that answer to any question is none of the four alternatives given under the question you should darken the circle with '0'.**

5. If you wish to change your answer, ERASE completely the already darkened circle by using a good quality eraser and then blacken the rectangle bearing your revised answer number. If incorrect answer is not erased completely, smudges will be left on the erased circle and the question will be read as having two answers by the Optical Mark Reader (OMR) and will be ignored for giving any credit.

6. No credit will be given if more than one answer is given for one question. Therefore, you should select the most appropriate answer.

7. You should not spend too much time on any one question. If you find any particular question difficult, leave it and go to the next. If you have time left after answering all the questions, you may go back to the unanswered ones.

8. There is no negative marking for wrong answers.

GENERAL INSTRUCTIONS

1. Mobile Phones, calculators, books, slide-rules, foot rulers, note-books or written notes, etc. are not allowed inside the examination hall.

2. You should follow the instructions given by the Centre Superintendent, Observers and by the Invigilators at the examination venue. If you violate the instructions you will be disqualified.

3. Any candidate found copying or receiving or giving assistance in the examination will be disqualified.

4. The Test Booklet and the OMR Answer Sheet would be supplied to you by the Invigilators. **After the exam is over, you should hand over the Test Booklet and the OMR Answer Sheet to the Invigilator before leaving the examination hall.** Any candidate who does not return the Question Booklet and the OMR Answer Sheet will be disqualified.

5. Candidates arriving late will not be permitted to enter the examination hall. The reporting time is 9.15 A.M. The examination will start at 10.00 A.M. and will be over at 12.00 noon.

6. All rough work is to be done on the test booklet itself and not on any other paper. Scrap paper is not permitted. For arriving at answers you may work in the margins, make some markings or underline in the test booklet itself.

7. The University reserves the right to cancel scores of any candidate who impersonates or uses malpractices. The examination is conducted under uniform conditions. The University would also follow a procedure to verify the validity of scores of all examinees uniformly. If there is substantial indication that your performance is not genuine, the University may cancel your score.

TEST I
MATHEMATICS

1. The sum of the two digits of a two-digit number is 8 and if the digits are reversed, the resulting number is 36 lower than the original number. The original number is

(1) 62 (2) 26

(3) 53 (4) 35

2. If the numerator and the denominator of a certain fraction are both increased by 1 each, the fraction becomes $\frac{1}{2}$. Instead, if they are increased by 4, the fraction becomes $\frac{2}{3}$. The original fraction is

(1) $\frac{5}{2}$ (2) $\frac{2}{5}$

(3) $\frac{3}{5}$ (4) $\frac{5}{3}$

3. For what value of k, will the following two equations become same ?

$2x - 3y = 5$; $6x + ky = 15$

(1) 9 (2) –9

(3) 3 (4) –3

4. The sum of the digits of a two-digit number is 9. If 9 is subtracted from the number, the digits interchange their places. The number is

(1) 45 (2) 54

(3) 36 (4) 63

5. The sum of the digits of a 2-digit number is 9. If a fraction is formed such that tens place digit is numerator and units digit is denominator, the fraction is $\frac{1}{2}$. The number is

(1) 36 (2) 63

(3) 45 (4) 54

6. The middle digit of a 3-digit number is 0 and the sum of the other two digits is 11. If the digits are reversed, the number so formed exceeds the original number by 495. The original number is

(1) 803 (2) 308

(3) 704 (4) 407

7. If $\frac{x^2-2x+3}{2x-3} = \frac{x^2-3x+5}{3x-5}$ then x is equal to

(1) 1 (2) 2

(3) 3 (4) 4

8. $\frac{2{\cdot}81 \times 2{\cdot}81 \times 2{\cdot}81 + 1{\cdot}19 \times 1{\cdot}19 \times 1{\cdot}19}{2{\cdot}81 \times 2{\cdot}81 - 2{\cdot}81 \times 1{\cdot}19 + 1{\cdot}19 \times 1{\cdot}19}$ is equal to

(1) 2·81 (2) 1·19

(3) 1·62 (4) 4

9. Seema is typing natural numbers on a computer. How many times must she press the keys of the keyboard to type the first 300 numbers ?

(1) 392 (2) 692

(3) 792 (4) 892

10. The sum of $\frac{1}{3}$rd, $\frac{1}{4}$th and $\frac{1}{5}$th of a number is 13 less than the number. The sum of squares of digits is

(1) 36 (2) 64

(3) 81 (4) 100

11. If $\sqrt{\left(\frac{5}{3}\right)^{x+4}} = \frac{81}{625}$, then the value of x is

(1) –12 (2) –10

(3) 12 (4) 10

12. $\frac{1}{3+\sqrt{5}} - \frac{1}{3-\sqrt{5}}$ is equal to

(1) $-\frac{\sqrt{5}}{2}$ (2) $\frac{\sqrt{5}}{2}$

(3) $\frac{2}{\sqrt{5}}$ (4) $-\frac{2}{\sqrt{5}}$

13. If $\left(\sqrt{3}\right)^{y+5} = (243)^{y-1}$, then y is equal to

(1) $\frac{5}{12}$ (2) $\frac{13}{5}$

(3) $\frac{12}{5}$ (4) $\frac{5}{3}$

14. A horse is tied to a peg fixed at one corner of a square field. If it grazes over an area of 154 m^2, then the length of the rope is

(1) 7 m (2) 49 m

(3) 14 m (4) 3·5 m

15. The least possible number which must be added to 10500 to make it a perfect square is

(1) 49 (2) 69

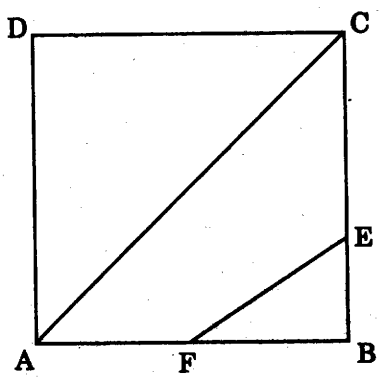
(3) 89 (4) 109

16. $\sqrt{176 - \sqrt{25 + \sqrt{576}}}$ is equal to

(1) 12 (2) 13

(3) 24 (4) 11

17. In the figure, ABCD is a square. AF = $\frac{1}{2}$ AB, BE = $\frac{1}{3}$ BC, AC = $36\sqrt{2}$. Then area of Δ BEF is



(1) 72 cm^2 (2) 144 cm^2

(3) 108 cm^2 (4) $216\sqrt{2}$ cm^2

18. If $x + \frac{1}{x} = 3$, then $\frac{x}{x^2+1}$ is

(1) 9 (2) $\frac{1}{3}$

(3) 13 (4) $\frac{1}{13}$

19. If a number is increased by 10% and then decreased by 10%, the number

(1) remains same

(2) decreases by 1%

(3) increases by 1%

(4) increases by 0·1%

20. The volume of the largest sphere that can be cut out of a cube of edge 14 cm is

(1) $\frac{1372}{3}\pi$ cm^3 (2) $\frac{343}{3}\pi$ cm^3

(3) $\frac{686}{3}\pi$ cm^3 (4) $343\,\pi$ cm^3

21. The difference between the smallest perfect square of 5-digits and greatest perfect square of 4-digits is

(1) 89 (2) 12

(3) 189 (4) 199

22. If PT is a tangent to a circle at T whose centre is O and OP = 17 cm, OT = 15 cm, then PT is equal to

(1) 8 cm (2) 12 cm

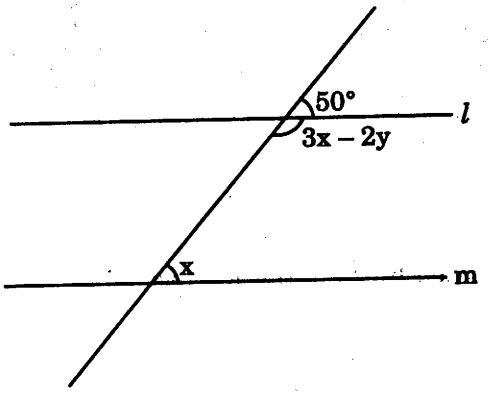
(3) 14 cm (4) 18 cm

23. If $x > y$ and x, y both are positive then

(1) $-x > -y$ (2) $\frac{1}{x} > \frac{1}{y}$

(3) $\frac{1}{x} < \frac{1}{y}$ (4) $\frac{1}{x} = \frac{1}{y}$

24. In figure $l \parallel m$. Then y is equal to



(1) 5°
(2) 10°
(3) 190°
(4) 60°

25. In an examination hall there is the seating arrangement from Roll No. 2026 to 2351. The numbers of chairs required are

(1) 325
(2) 324
(3) 326
(4) 327

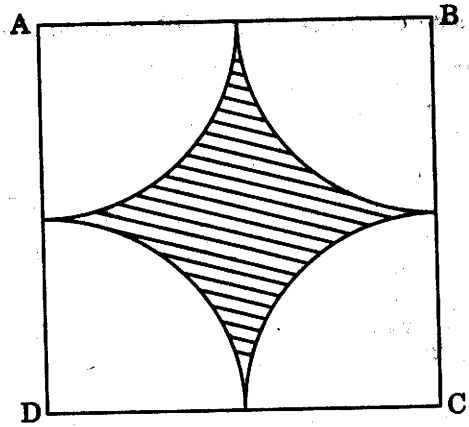
26. If a person is standing on the tenth position in a line from both the ends, the total number of persons are

(1) 17
(2) 18
(3) 19
(4) 20

27. If $x - \frac{1}{x} = 3$, then $x^2 + \frac{1}{x^2}$ is equal to

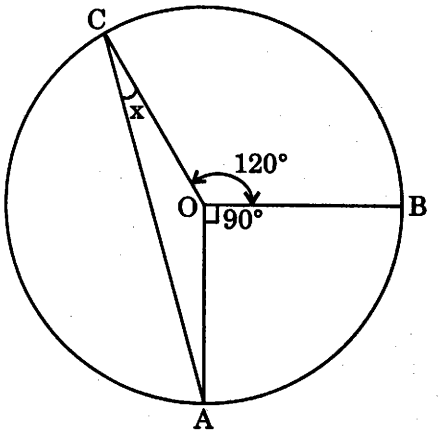
(1) 11
(2) 7
(3) 5
(4) 1

28. Find the area of shaded portion if AB = BC = CD = DA = 14 cm.



(1) 154 cm^2
(2) 196 cm^2
(3) 42 cm^2
(4) 21 cm^2

29. From the adjoining figure, if $\angle$ COB = 120° and $\angle$ AOB = 90°, when O is the centre of the circle, then the value of x is



(1) 15° (2) 20°

(3) 30° (4) 35°

30. If the radius of a sphere be doubled, then its volume will

(1) be doubled (2) be tripled

(3) become four times (4) become eight times

31. The mean of six numbers 3, 7, x, 10, 15 and 5 is 8. Then x is equal to

(1) 4 (2) 6

(3) 8 (4) 12

32. The area of a square with diagonal $\sqrt{128}$ is

(1) 128 cm^2 (2) $8\sqrt{2}$ cm^2

(3) 64 cm^2 (4) 16 cm^2

33. Shiv Kumar and Seema take 8 days to complete a work. If Shiv Kumar does it in 12 days alone, then Seema will do it alone in

(1) 4 days (2) 16 days

(3) 20 days (4) 24 days

34. If V and C stand respectively for the volume and curved surface area of a cylinder with base of radius r, then

(1) $VC = \pi r$ (2) $2V = Cr$

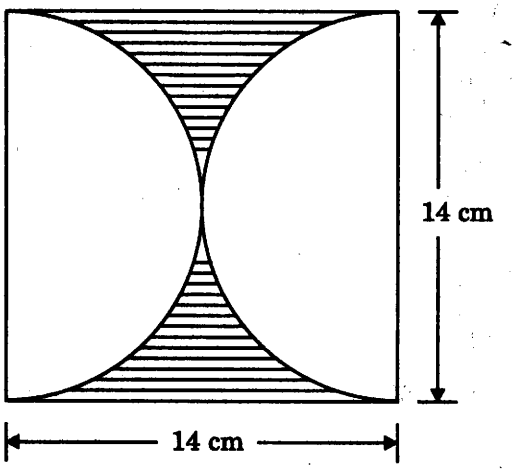
(3) $2C = Vr$ (4) $2r = VC$

35. Square root of 0·000001 is

(1) 0·1 (2) 0·01

(3) 0·001 (4) 0·0001

36. In the adjoining figure, the area of the shaded portion is



(1) 21 cm^2 (2) 42 cm^2

(3) 84 cm^2 (4) 49 cm^2

37. If the mean of five observations x, x + 2, x + 4, x + 6 and x + 8 is 11, then the mean of the first three observations is

(1) 7 (2) 9

(3) 11 (4) 13

38. If $\frac{4}{9}$ of a bucket is filled in 1 minute, then the rest of it will be filled in

(1) 1 min (2) $\frac{9}{4}$ min

(3) $\frac{5}{4}$ min (4) $\frac{9}{5}$ min

39. The level of water is doubled every minute in a bucket. If it is half-filled in 20 minutes, then it will be completely filled in

(1) 30 minutes (2) 40 minutes

(3) 21 minutes (4) 1 hour

40. If $x^2 = y^3$ and $x^3 = p^2$, then

(1) $y^2 = p^3$ (2) $y^3 = p^5$

(3) $y^4 = p^9$ (4) $y^9 = p^4$

TEST II
PHYSICS

41. One kg weight is equivalent to

(1) 19·6 newton

(2) 9·8 ergs

(3) 9·8 newton

(4) 4·9 newton

42. Mass of a moving body can be calculated by

(1) $M = F \times a$

(2) $M = a/F$

(3) $M = F/a$

(4) $M = \sqrt{aF}$

43. $kgms^{-2}$ stands for unit of

(1) momentum

(2) impulse

(3) work

(4) force

44. When we jump out of a boat standing in water it moves

(1) sideways

(2) backward

(3) forward

(4) into the water

45. If a body of mass 4 kg is moving with a velocity 2 ms^{-1}, then the kinetic energy of the body is

(1) 8 J (2) 16 J

(3) 4 J (4) 32 J

46. Nuclear radii is measured in

(1) micron (2) fermi

(3) angstrom (4) nanometre

47. If the angular velocity of a particle moving in a circle is 'ω' about its centre, then its value about a point on the circumference is

(1) ω (2) $\omega/2$

(3) 2ω (4) 3ω

48. Which law provides the fundamental definition of force ?

(1) First law of motion

(2) Second law of motion

(3) Third law of motion

(4) Universal law of gravitation

49. The absolute zero temperature in Kelvin scale is equal to

(1) 0 (2) –273

(3) 273 (4) 100

50. A ball is thrown vertically upwards. The acceleration due to gravity is

(1) maximum at the highest point

(2) minimum at the highest point

(3) same throughout

(4) maximum at the point of projection

51. 1 kgm^2s^{-2} is equal to

(1) 10^7 ergs

(2) 10^7 J

(3) 1 erg

(4) 4·2 J

52. Which of the following statements is ***not*** correct in respect of Archimedes Principle ?

(1) The liquid body must be static

(2) A submerged body loses a part of its weight

(3) A submerged body loses its weight altogether

(4) The apparent loss in weight is equal to the weight of liquid displaced

53. The C.G.S. unit of heat is

(1) Therm

(2) Calorie

(3) B.Th.U.

(4) Kelvin

54. At the time of rain relative humidity of air becomes

(1) 50% (2) 100%

(3) 80% (4) Nil

55. Sound is a

(1) vibration

(2) wave

(3) flowing fluid

(4) moving mass

56. Velocity of sound in a medium having constant temperature is

(1) inversely proportional to its pressure

(2) directly proportional to its pressure

(3) independent of pressure

(4) directly proportional to the square root of its pressure

57. Frequency of ultrasonic wave is

(1) below 20,000 per sec

(2) above 20,000 per sec

(3) only 20,000 per sec

(4) above 40,000 per sec

58. Which of the following is ***not*** a unit of energy ?

(1) Joule

(2) Erg

(3) Watt

(4) kWh

59. The velocity of light in air is 3×10^8 ms^{-1}. The velocity of light in glass will be (Refractive index of glass = 1·5)

(1) 3×10^8 ms^{-1}

(2) 2×10^8 ms^{-1}

(3) $2{\cdot}5 \times 10^8$ ms^{-1}

(4) $1{\cdot}5 \times 10^8$ ms^{-1}

60. Which one has the greatest value of wavelength ?

(1) Ultraviolet light

(2) Infrared light

(3) Yellow light

(4) Green light

TEST III
CHEMISTRY

61. Which branch of chemistry deals with carbon containing compounds ?

(1) Physical chemistry

(2) Analytical chemistry

(3) Organic chemistry

(4) Inorganic chemistry

62. How many bonds are there in N_2 ?

(1) 1 (2) 2

(3) 3 (4) 4

63. A mixture of CO and H_2 gases is known as

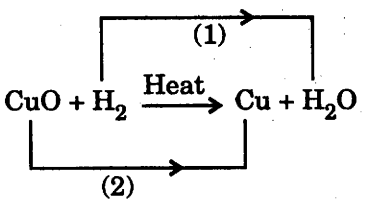
(1) carbon gas

(2) carbon and hydrogen gas

(3) water gas

(4) biogas

64. Which of the following is a correct combination of answers in terms of oxidation and reduction in the given chemical reaction ?



(1) Line (1) represents reduction, (2) represents oxidation

(2) Line (1) represents oxidation, (2) represents reduction

(3) Line (1) represents oxidation, (2) represents oxidation

(4) Line (1) represents reduction, (2) represents reduction

65. L-shell has capacity of accommodating a maximum of

(1) 2 electrons (2) 4 electrons

(3) 6 electrons (4) 8 electrons

66. Which one among the following is an electrolyte ?

(1) CCl_4 (2) C_6H_6

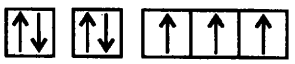
(3) CH_3COOH (4) $C_{12}H_{22}O_{11}$

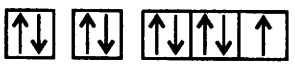
67. Corrosion of a metal starts at the surface exposed to

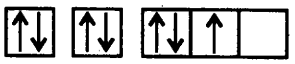
(1) dry air (2) kerosene

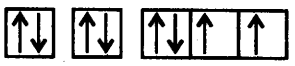
(3) water and air (4) None of the above

68. Which one of the following electronic configurations violates Hund's rule ?

(1) 

(2) 

(3) 

(4) 

69. "No two electrons in an atom can have the same set of four quantum numbers" is the statement of

(1) Aufbau principle

(2) Pauli's exclusion principle

(3) Bohr's theory

(4) Hund's rule

70. de Broglie relation of matter wave is

(1) $\lambda = c/v$ (2) $\lambda = h/mc$

(3) $\lambda = h/mv$ (4) $\lambda = hc/E$

71. The electronic configurations of four elements are given below :

A = $1s^2\ 2s^2\ 2p^1$; B = $1s^2\ 2s^2\ 2p^2$

C = $1s^2\ 2s^2\ 2p^5$; D = $1s^2\ 2s^2\ 2p^6\ 3s^1$

Which one of the above elements would form a diatomic molecule ?

(1) A (2) B

(3) C (4) D

72. Which out of the following is the strongest base ?

(1) NaCl (2) NaOH

(3) $NaHCO_3$ (4) $NaHSO_4$

73. Which of the following expressions at constant pressure represents Charles's law ?

(1) $V \propto \frac{1}{T}$ (2) $\frac{1}{V} \propto \frac{1}{T}$

(3) $T \propto \frac{1}{V}$ (4) $V \propto \frac{1}{P}$

74. What is the total number of electrons in Cl^- ?

(1) 17 (2) 18

(3) 16 (4) 19

75. Which one of the following bonds is non-polar ?

(1) The H – Cl bond in HCl

(2) The N – N bond in N_2

(3) The C – Cl bond in CCl_4

(4) The C = O bond in CO_2

76. A hybrid orbital has 25% *s*-character and 75% *p*-character. To which type of hybridization does it belong ?

(1) sp^3 (2) sp^2

(3) sp (4) s^3p

77. The molecular weight of a base is W. Its acidity is 1. What would be its equivalent weight ?

(1) Double the molecular weight

(2) Equal to the molecular weight

(3) Half the molecular weight

(4) None of the above

78. The atomic number of an element is 20. Its valency would be

(1) 1 (2) 2

(3) 3 (4) 4

79. How many σ and π bonds are there in H – C ≡ C – H ?

(1) 5 σ bonds, no π bond

(2) 4 σ bonds, 1 π bond

(3) 3 σ bonds, 2 π bonds

(4) 2 σ bonds, 3 π bonds

80. Acetic acid is a weak electrolyte, because

(1) its molecular weight is high

(2) it has more number of atoms

(3) acetic acid is weakly ionised

(4) acetic acid is an organic acid

TEST IV
GENERAL AWARENESS AND COMMUNICATION SKILLS

81. The capital of Nagaland is

(1) Agartala
(2) Aizawl
(3) Guwahati
(4) Kohima

82. The Taj Mahal was built during

(1) 15^{th} century
(2) 14^{th} century
(3) 16^{th} century
(4) 17^{th} century

83. Impure blood is received in which part of the heart ?

(1) Right Auricle
(2) Left Auricle
(3) Right Ventricle
(4) Left Ventricle

84. The third planet in our Solar System counting from that closest to the Sun is

(1) Earth
(2) Mars
(3) Jupiter
(4) Venus

85. The rank of Colonel in the Army is equivalent to

(1) Commodore in Navy
(2) Captain in Navy
(3) Rear Admiral in Navy
(4) Commander in Navy

86. The book "Harry Potter and the Sorcerer's Stone" was written by

(1) Arundhati Roy
(2) Justin Hoffman
(3) R.K. Narayan
(4) J.K. Rowling

87. Commonweath Games 2010 will be held in

(1) Delhi
(2) Melbourne
(3) London
(4) Beijing

88. Which vitamin contains Folic Acid ?

(1) Vitamin A
(2) Vitamin C
(3) Vitamin B complex
(4) Vitamin D

89. On the distinctive shape of the leaf of which tree was the Bharat Ratna crafted ?

(1) Peepal
(2) Ashoka
(3) Banyan
(4) Sheesham

90. Which country is known as "The Land of Rising Sun" ?

(1) Australia
(2) Fiji
(3) Thailand
(4) Japan

Directions : *In questions 91, 92, 93 and 94, fill in the blanks with appropriate words so as to complete the sentence in the best possible manner.*

91. Tempers ran high among the old timers who _____ the young Mayor and his reformist Municipal Council.

(1) despised
(2) admired
(3) resented
(4) feared

92. Working _____ under the pressure of time, Rohan did not notice his careless mistake.

(1) continually
(2) frantically
(3) rapidly
(4) sporadically

93. We are _____ going to have to face the reality that the resources of the Earth are finite.

(1) finally
(2) eventually
(3) gradually
(4) quickly

94. Although her initial success was _____ by the fact that she was the daughter of a famous actor, the critics later acclaimed her as a star in her own right.

(1) enhanced
(2) impeded
(3) superceded
(4) trivialized

Directions : *For questions 95, 96, and 97, state the choice closest in meaning to the given word (synonym).*

95. MUNDANE

(1) Ordinary
(2) Stale
(3) Comprehensible
(4) Supernatural

96. IMPLICATE

(1) assume
(2) assist
(3) embroil
(4) impel

97. FANATICAL

(1) dream-like
(2) fantastic
(3) fanciful
(4) extreme

Directions : *For questions 98, 99 and 100, select the choice closest to the opposite in meaning of the given word (antonyms).*

98. HOSTILE

(1) friendly
(2) unwise
(3) adverse
(4) hospitable

99. CEASE

(1) stop
(2) break off
(3) begin
(4) honour

100. HARMONIOUS

(1) cooperative
(2) better
(3) discordant
(4) difficult

SPACE FOR ROUGH WORK