OPENDET – VII : Entrance Test for Engineering Diploma Programmes November, 2006

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 rectangle 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 rectangle 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 rectangle '0'.
- 5. If you wish to change your answer, ERASE completely the already darkened rectangle 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 rectangle 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.	$\left\{\frac{1}{2}(x+5)\right\} = 2x + 3$. Find x.
	(1) -1 (2) $-\frac{1}{2}$
· · · ·	(3) $-\frac{1}{3}$ (4) $-\frac{1}{4}$
2.	Product of two polynomial expressions is $x^3 - 27$ and one of the expressions is $x^2 - 9$. Find their GCD and LCM.
	(1) GCD = 1, LCM = $x^3 - 27$
	(2) GCD = $(x - 3)$, LCM = $x^3 - 27$
	(3) GCD = 1, LCM = $(x^3 - 27) (x^2 - 9)$
	(4) GCD = $(x - 3)$, LCM = $(x^3 - 27) (x^2 - 9)$
3.	$\sqrt{3} \times \sqrt{27} \times \sqrt[3]{16} \times \sqrt[3]{4} =$
	(1) 12 (2) 64
	(3) 36 (4) None of the above
4.	$\sin 45^{\circ} \cdot \cos 60^{\circ} \cdot \tan 45^{\circ} \cdot \sec 45^{\circ} = ?$
	(1) $\sin 30^{\circ}$ (2) $\sin 60^{\circ}$
	(3) $\sin 45^{\circ}$ (4) $\sin 90^{\circ}$
5.	x + 2y = 18 and $3x - 2y = 27$ Find x and y
	(1) $x = \frac{44}{5}, y = \frac{24}{7}$ (2) $x = \frac{45}{4}, y = \frac{27}{6}$
	(3) $x = \frac{47}{4}, y = \frac{27}{4}$ (4) $x = \frac{45}{5}, y = \frac{27}{5}$
6.	One-third of a number is equal to 27. The number is
	(1) 9 (2) 3
	(3) 27 (4) 81
7.	Area of an equilateral triangle is equal to $18\sqrt{3}$ m ² . Find the side of the triangle.
	(1) $2\sqrt{6}$ m (2) $6\sqrt{2}$ m
	(3) 12 m (4) 6 m

4

8.
$$\frac{\sin^2}{\cos^2}$$

10.

....

60°

 30°

= ?

(1)
$$\frac{\sqrt{3}}{4}$$
 (2) $\frac{\sqrt{3}}{16}$
(3) $\frac{3}{16}$ (4) 1

9. Volume of a right circular cylinder is equal to 36 cm³ and radius of its base is equal to 12. Find its height.

(1)	$\frac{1}{4}$ cm	(2)	$\frac{1}{4\pi}$ cm
(3)	$\frac{\pi}{4}$ cm	(4)	$\frac{4}{\pi}$ cm
$\frac{\sqrt{6}}{\sqrt[3]{21}}$	$\frac{4 \times 9}{6 \times 64} = ?$		
(1)	$\frac{3}{9}$	(2)	1
(3)	$\frac{3}{2}$	(4)	$\frac{2}{9}$

11. The average of first six multiples of 3 is

(1)	12		(2)	10.5
(3)	13		(4)	15.5

12. The price of 357 mangoes is Rs. 1517.25. What is the price of 49 dozens of such mangoes ? (Approximate price)

(1)	Rs. 3000	(2)	Rs. 3500
(3)	Rs. 4000	(4)	Rs. 2500

13. 0.02 = x%, the value of 'x' is

(1)	20	r.	(2)	2
(3)	0.02		(4)	0.2

14. The sum of two numbers is 15 and the sum of their squares is 117. The numbers are

 (1)
 4, 11
 (2)
 5, 10

 (3)
 6, 9
 (4)
 7, 8

If $\frac{\frac{1}{\sqrt{9}} - \frac{1}{\sqrt{11}}}{\frac{1}{1} + \frac{1}{1}} \times \frac{10 + \sqrt{99}}{x} = \frac{1}{2}$, then the value of x is 15. $\sqrt{9}$ (2)3 2 (1)None of the above (4) (3)4 The value of $\sqrt{0.0064}$ is 16. 0.08 (1)0.8(2)0.252(3)0.008 (4) $\left\{ \left(2 + \frac{1}{2} - 3\right) \div \left(6 + \frac{1}{7} \times 2\right) \right\} = ?$ 17. (2) $-\frac{7}{88}$ (1) $-\frac{22}{7}$ (4) $-\frac{7}{22}$ (3) $-\frac{88}{7}$ 18. 896 × 896 - 204 × 204 = (2)1100 692 (1)7000000 (4)(3)761200

19. Volume of a hemisphere of radius 'r' is equal to

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

20. In the following figure, AB = 8.4 cm, PR = 5.0 cm, and PQ = 4.8 cm. Find the lengths of BC, CA and QR.



(1) 10 cm, 9.6 cm, 4.8 cm

- (2) 10 cm, 9.6 cm, 4.2 cm
- (3) 10 cm, 9.8 cm, 4.8 cm
- (4) 10 cm, 9.8 cm, 4.2 cm



7

28.	If $\tan \theta = \frac{4}{3}$, find the value of	$\frac{\sec\theta-1}{\sec\theta+1}.$	an an an an an Alla An Alla
	(1) $\frac{1}{8}$	(2) $\frac{1}{4}$	
	(3) $\frac{1}{2}$	(4) 1	
29.	$\frac{a^{x}}{a^{y} \cdot a^{z}} = ?$		
	$(1) a^{x-y+z}$	$(2) a^{x-y-z}$	
	(3) $a^{x(y-z)}$	$(4) a^{x+y-z}$	
30.	$\tan A = \frac{4}{3}$ and $\tan B = \frac{3}{4}$. F	ind the value of $\frac{\tan 1}{1+1}$	$\frac{n A - tan B}{tan A tan B}.$
	(1) $\frac{12}{7}$	(2) $\frac{12}{5}$	
	(3) $\frac{5}{12}$	(4) $\frac{7}{24}$	
			2 am broad

31. Find the volume of a cuboidal box. Given its length = 3 cm, breadth = 12 cm and height = 4 cm.

- (1) 144 cm^3 (2) 114 cm^3 (3) 411 cm^3 (4) 410 cm^3
- **32.** If x and y are two positive real numbers, then which of the following statements will always hold true ?

(2) b

a.	$xy - x^2 > 0$
b.	$\frac{x^3}{y} > 0$
c.	$x^3 - y > 0$
(1)	a

(3) c (4) None of the above

33. If $\theta = 60^{\circ}$ and $\alpha = 45^{\circ}$, find the value of $(\sin \theta \cos \alpha + \cos \theta \sin \alpha)$.

- (1) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (2) $\frac{\sqrt{3}+2}{2\sqrt{2}}$
- (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{\sqrt{3}+1}{2\sqrt{2}+1}$

Identity $\sin^2 \theta = 1 - \cos^2 \theta$ 34.

- is true only iff $\theta \ge 90^{\circ}$ (1)
- is true only iff $\theta < 90^{\circ}$ (2)
- (3) is always true
- is a wrong identity (4)

Find the area of a rectangle whose perimeter is equal to 36 cm and whose length is twice 35. of its breadth.

(2) 72 cm^2 (1) 12 cm^2 (4) 48 cm^2 36 cm^2 (3)

36. $\cos \theta$ is

38.

- a value, lying between -1 and 1(1)
- (2)an angle
- (3)both (1) and (2)
- None of the above (4)

The length of a square is equal to 14 cm. Find the length of its diagonal. 37.

(1)	56 cm	(2)	$14\sqrt{2}$ cm
(3)	$56\sqrt{2}$ cm	(4)	$28\sqrt{2}$ cm
<u>(x</u> ²	$\frac{(-3)(x+\sqrt{3})}{x^4-9} = ?$		
(1)	$x + \sqrt{3}$	(2)	$\frac{1}{x+\sqrt{3}}$
(3)	$x - \sqrt{3}$	(4)	$\frac{x+\sqrt{3}}{2}$

39.
$$\frac{(x^2 - 6x + 9)(x^2 + 4x + 4)(x - 4)}{(x^2 - 7x + 12)(x + 2)} =$$
(1) $x^2 - 5x + 6$
(2) $x^2 - x - 6$
(3) $x^2 - x + 6$
(4) $x^2 - 5x - 6$

40.
$$\frac{4}{9}$$
 (sec² 60° - 1) (cosec² 30° - 1) =

(2)(1) 4 0 $\frac{9}{4}$ 4 (4)(3) 9

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 $\frac{1}{x^2 + 3}$

TEST II

PHYSICS

41. The velocity of a body is given in terms of time 't' by the equation $v = \alpha t + \beta/t$. The dimensions of α and β are respectively

- (1) LT^{-2} , L
- (2) L^2 , T
- (3) L, LT
- (4) LT^{-2} , LT

42. The least count of a vernier calliper is 0.001 cm. One cm on the main scale is divided into 20 divisions. How many divisions are there on the vernier scale ?

- (1) 40 (2) 30
- (3) 20 (4) 50
- 43. Newton's First Law is based in part on the work of
 - (1) Dalton
 - (2) Davy
 - (3) Galileo
 - (4) Joule
- 44. Which one of the following is a vector quantity ?
 - (1) Current
 - (2) Pressure
 - (3) Momentum
 - (4) Work
- **45.** A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg. The velocity of 8 kg mass is 6 m/s. The kinetic energy of the other mass is
 - (1) 48 J
 (2) 288 J

 (3) 144 J
 (4) 24 J
- 46. The distance travelled by a body falling from rest in the first, second and third seconds are in the ratio
 - (1) 1:2:3
 - (2) 1:3:9
 - (3) 1:3:5
 - (4) None of the above

47. A force of 100 N acts on a mass of 10 kg for 5 seconds. The velocity produced will be

- (1) 50 m/s (2) 200 m/s
- (3) 2000 m/s (4) 20 m/s

48. Which of the following is **not** the unit of power?

- (1) Watt (2) J/s
- (3) Kilowatt-hour (4) N-m/s

49. An electric motor creates a tension of 3000 Newtons in a hoisting cable and reels it in at the rate of 2 m/s. What is the power of electric motor ?

- (1) 12 kW
- (2) 6 kW
- (3) 6000 H.P.
- $(4) \quad 1500 \text{ watts}$
- 50. Out of the following which one is less ?
 - (1) Static friction
 - (2) Sliding friction
 - (3) Rolling friction
 - (4) All are same
- 51. Cream gets separated out of the milk when it is churned because of
 - (1) frictional force
 - (2) centrifugal force
 - (3) gravitational force
 - (4) cohesive force

52. The acceleration due to gravity of catastrophic earthquake will be

- (1) more than 950 cm/s^2
- (2) more than 750 cm/s^2
- (3) more than 550 cm/s^2
- (4) more than 980 cm/s^2
- 53. The mass of the Earth is 80 times the mass of a planet and diameter is twice than that of the planet. Then the acceleration due to gravity on the planet's surface is (g on the Earth = 9.8 ms^{-2})
 - (1) 0.49 m/s^2
 - (2) 9.8 m/s^2
 - (3) 1.6 m/s^2
 - (4) 0.8 m/s^2

54. The mercury column in the barometer falls rapidly before a severe storm due to

- (1) rise in atmospheric pressure
- (2) fall in atmospheric pressure
- (3) decrease in humidity
- (4) None of the above

55. The sound waves which *cannot* be heard by a human ear are called

- (1) ultrasonic
- (2) infrasonic
- (3) sonic
- (4) both (1) and (2)
- 56. Colour of a star is an indication of its
 - (1) distance from the Earth
 - (2) temperature
 - (3) distance from the Sun
 - (4) luminosity

57. The refractive index of a medium is 1.5. If the speed of light in air is 3×10^8 m/s then its speed in the medium will be

- (1) 2×10^8 m/s
- (2) 1.2×10^8 m/s
- (3) 4×10^8 m/s
- (4) 3.2×10^8 m/s

58. Fuse, used in electrical circuits, is made of a material having

- (1) high melting point
- (2) high resistance
- (3) low melting point
- (4) low specific heat
- 59. Four resistances 5, 10, 20 and 30 Ω respectively are connected in parallel to a cell of emf 8 volts. The potential difference across the 10 Ω resistance will be
 - (1) 8 V
 - (2) 4 V
 - (3) 2 V
 - (4) 1 V

60. Which combination of the following devices are arranged as per their date of invention ?

- (i) Semiconductors
- (ii) Vacuum tubes
- (iii) Integrated circuits
- (iv) Micro-computers
- (1) (i), (ii), (iii), (iv)
- (2) (ii), (i), (iii), (iv)
- (3) (iv), (ii), (i), (iii)
- (4) (iii), (i), (ii), (iv)

TEST III CHEMISTRY

- 61. A compound may be separated into its elements by
 - (1) Evaporation
 - (2) Decomposition
 - (3) Synthesis
 - (4) Destructive distillation
- **62.** 2 Na + Cl₂ \rightarrow 2 NaCl. This reaction is a type of
 - (1) Decomposition
 - (2) Replacement
 - (3) Substitution
 - (4) Combination
- **63.** Which of the following is a cation ?
 - (1) NH_{4}^{+}
 - (2) Cl⁻
 - (3) CaCO₃
 - (4) Na
- **64.** The shape of 'p' orbital is
 - (1) Pyramidal
 - (2) Spherical
 - (3) Tetrahedral
 - (4) Dumb-bell

65. The maximum number of electrons in 'f' orbital is

- (1) 2
- (2) 8
- (3) 32
- (4) 14

66. Pauli's exclusion principle states that

- (1) the nucleus of an atom is negatively charged
- (2) electrons revolve around the nucleus in circular orbit
- (3) electrons enter into the lowest energy orbitals
- (4) no two electrons in an atom can have all the four quantum numbers identical

- 67. When electron jumps from L to K shell
 - (1) energy is absorbed
 - (2) energy is released
 - (3) energy is neither released nor absorbed
 - (4) energy is sometimes absorbed and sometimes released
- 68. An electrovalent compound is made up of
 - (1) electrically charged particles
 - (2) neutral molecules
 - (3) neutral atoms
 - (4) oppositely charged ions
- 69. The variable valency is observed in
 - (1) Normal elements
 - (2) Transition elements
 - (3) Metallic elements
 - (4) Inert elements
- 70. Two or more elements combine to form molecules so as to
 - (1) gain two electrons in their outermost orbital
 - (2) get eight electrons in their outermost orbital
 - (3) get stable electronic configuration
 - (4) get eighteen electrons in the outermost orbital
- 71. Cation is produced when
 - (1) electron is gained by an atom
 - (2) electron is lost by an atom
 - (3) proton is lost by an atom
 - (4) neutron is lost by an atom
- 72. A gas is said to behave like an ideal gas when the relation $\frac{PV}{T}$ = constant. When do you expect a real gas to behave like an ideal gas ?
 - (1) When the temperature is low
 - (2) When both the temperature and pressure are low
 - (3) When both the temperature and pressure are high
 - (4) When the temperature is high and the pressure is low
- **73.** "At constant temperature and pressure equal volumes of all gases contain the same number of molecules." This is known as
 - (1) Hund's rule
 - (2) Avogadro's hypothesis
 - (3) Gay Lussac's law
 - (4) Charles' law

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

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

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

75. Hydrogen diffused 5 times as rapidly as another gas 'A'. Molecular weight of gas 'A' will be

- (1) 10
- (2) 50
- (3) 25
- (4) 100
- 76. A polar solvent has
 - (1) low value of dielectric constant
 - (2) high value of dielectric constant
 - (3) dielectric constant equal to one
 - (4) a higher boiling point
- 77. Acetic acid is a weak electrolyte, because
 - (1) its molecular weight is high
 - (2) it is a covalent compound
 - (3) its dissociation is low
 - (4) it is highly unstable
- 78. Sulphuric acid is a stronger acid than acetic acid, because
 - (1) it dissociates completely
 - (2) it has high molecular weight
 - (3) acetic acid is weakly ionised
 - (4) acetic acid is an organic acid

79. A galvanic cell converts

- (1) electrical energy into chemical energy
- (2) chemical energy into electrical energy
- (3) electrical energy into heat energy
- (4) chemical energy into heat energy

80. The potential of the standard hydrogen electrode is taken as

(1)	1 volt				(2)	0 volt	
(3)	10 volt		·		(4)	5 volt	

TEST IV

GENERAL AWARENESS AND COMMUNICATION SKILLS

81.	The capital of Tripura is		
	(1) Itanagar	(2)	Aizawl
	(3) Agartala	(4)	Kohima
82.	Relative humidity is usually measured	by	
0_1	(1) Hydrometer	(2)	Barometer
	(3) Hygrometer	(4)	Lactometer
83.	"Iread Mill Test" is associated with	(0)	Tunga
	(1) Heart	(\mathbf{Z})	Lungs
	(3) Kidney	(4)	Legs
84.	During the Mughal period which one traders ?	of t	he following were the first to come to India as
	(1) Portuguese	(2)	Dutch
	(3) Danish	(4)	English
85.	Who is the External Affairs Minister	ofIn	dia ?
000	(1) Dr. Manmohan Singh		
	(2) Mr. Arjun Singh		
	(3) Mr. Natwar Singh		
	(4) None of the above		
86.	What does "SIM" stand for ?		
	(1) Signal Information Mode		
	(2) Simple Identity Mode		
	(3) Subscribers Identity Module		
	(4) Selling Information Matrix		
87.	Which of the following acids is preser	nt in	our stomach ?
	(1) Sulphuric acid		
	(2) Hydrochloric acid		
	(3) Nitric acid		
	(4) None of the above		
88.	Which among the following is the ric	hest	source of protein ?
	(1) Barley	(2)	Wheat
	(3) Rice	(4)	Soyabean

89. Which of the following is mismatched ?

(1)	Mathura		Oil refinery
(2)	Visakhapatnam		Aircraft
(3)	Sindri		Fertilizer
(4)	Kapurthala	<u> </u>	Railway Coaches

90. The organisation with the abbreviation 'TRAI' deals with

- (1) Trade Reforms
- (2) Tourism and Travel
- (3) Telecommunications
- (4) Taxation

Directions : In questions no. 91, 92, 93 and 94, fill in the blanks with appropriate words so as to complete the sentence in the best possible manner.

I am sure that neither the house nor its contents ______ for sale. 91. (1)is (2)are (3)have been (4)were 92. I have read one novel by Premchand. I want to read ______. (1)other (2)another (3)all (4)few Where there is a _____, there is a _____ 93. (1)man, woman (2)boy, girl (3)father, mother (4) will, way No doubt he has achieved much, but I cannot give him credit ______ all that he boasts. 94. (1)through (2)for (3)from (4) with

Directions : For questions no. 95, 96 and 97, state the choice closest in meaning to the given word (synonym).

95. BRIEF

- (1) Limited
- (2) Small
- (3) Little
- (4) Short

96. CANDID

- (1) Apparent
- (2) Explicit
- (3) Frank
- (4) Bright

97. VIGOUR

- (1) Strength
- (2) Boldness
- (3) Warmth
- (4) Enthusiasm

Directions : In questions no. 98, 99 and 100, select the choice which is closest to the opposite in meaning of the given word (antonym).

98. ORTHODOX

- (1) Moderate
- (2) Conservative
- (3) Bold
- (4) Conventional

99. LUCID

- (1) Friendly
- (2) Greedy
- (3) Clear
- (4) Cluttered

100. MUNDANE

- (1) Ordinary
- (2) Extraordinary
- (3) Mysterious
- (4) Convincing