ADMISSION TEST

BS Mechanical Engineering

Fall, 2011

Faculty of Engineering & Technology
International Islamic University
ISLAMABAD

Roll No. -----------

Brief Instructions to Candidates

1. **Any one who violates any of the following instructions will be immediately disqualified.**

2. Please ensure you have no calculator, any item or information with you in the paper. Your mobile phone must be switched off and in your pocket. After the paper is distributed you are not supposed to look around, whisper, borrow or, lend anything.

3. Nobody will leave before ½ time.

4. There are a total of **100** questions and total time is **120** minutes.

5. You will get **1** mark for each correct answer, **0** mark for no answer. Selecting more than one option will give you **0** mark.

6. Once the time is over put down your pens and put the answer sheet inside the question paper booklet and sit back.

Filling In The Answer Sheets

7. **Your answer sheet will be checked by a machine. If you do not comply with the instructions your answers will not be graded correctly.**

8. On the backside of the answer sheet find the space for your name and roll number. Write down your name in block letters and sign the sheet.

9. On the front of the answer sheet, every entry by you will require selecting one circle out of many. Mark the correct one by <u>COMPLETELY</u> filling in the circle representing it. Ink should not spread outside the boundary line of the circle.

10. Write the colour of your booklet next to your name ON THE BACKSIDE of your answer sheet.

11. If you fill in the wrong colour or fill it in on the front side of the sheet, the machine reader may fail you.

12. You can do rough work inside the question booklet wherever you like. Spare sheets are also provided at the end of the booklet

13. After the paper is collected, keep sitting to fill in and sign your attendance sheet which will be circulated.

14. All students must fill and sign their attendance sheet else they will be eliminated from the Admission test.

15. **If you violate any instruction, your paper will be cancelled and admission refused.**

16. **Do not open the next page of the question booklet until you are told.**

Q. No. 1 If ω & ω^2 are cube roots of unity then $\{1 - \omega - \omega^2\}^5 =$

(A). 0
(B). 1
(C). 32
(D). *None of these*

Q. No. 2 If a, a+d, a+2d, ... then $a_n =$

(A). $a + nd$
(B). $a - nd$
(C). $a + (n-1)d$
(D). $a + (n+1)d$

Q. No. 3 If x is so small that its square and higher powers be neglected then $(1 + 3x)^{-2} =$

(A). $1 + 9x$
(B). $1 - 9x$
(C). $1 + 6x$
(D). $1 - 6x$

Q. No. 4 A die is rolled then probability of getting a number which is even or greater than 4 is:

(A). 2/3
(B). 1/6
(C). 1/2
(D). 5/6

Q. No. 5 A committee of 4 persons is to be chosen from 6 men and 4 women. How many of these will have 3 women?

(A). 4
(B). 6
(C). 10
(D). 24

Q. No. 6 The number of ways a hockey eleven can be selected out of 15 players if it includes a particular player:

(A). C_{11}^{15}
(B). C_{11}^{14}
(C). C_{10}^{14}
(D). C_{10}^{15}

Q. No. 7 The number of diagonals in 8-sided figure is:

(A). 64
(B). 20
(C). 48
(D). 16

Q. No. 8 The number of terms in the expansion of $(2x + y)^6$ are:

(A). 6
(B). 7
(C). 8
(D). 14

Q. No. 9 Which of the following series is convergent?

(A). $2 - 6 + 8 - \cdots$
(B). $8 + 4 + 2 + \cdots$
(C). $5 + 10 + 20 + \cdots$
(D). $\frac{3}{2} + 3 + 6 + \cdots$

Q. No. 10 He shouted "Let me go." [Change to indirect speech]

(A). *He requested that let him go*   **(B).** *He shouted to let him go*

(C). *He shouted to them to let him go*   **(D).** *He implored them to let me go*

Q. No. 11 If a = 3, r = 2/3, then sum of the infinite S_x =

(A). 9   **(B).** 9/2

(C). 2/9   **(D).** 3/2

Q. No. 12 The general term of the sequence 3,6,9,12, ………. is:

(A). n **(B).** $2n$

(C). $3n$ **(D).** n^2

Q. No. 13 A post 30 m high is supported by wire attached to its top and a point on level ground 40 m from the foot of the post, then length of wire is:

(A). 70   **(B).** 50

(C). 60   **(D).** 80

Q. No. 14 If a = 4, b = 3, r = 30°, then area Δ ABC is:

(A). 16   **(B).** 12

(C). 9   **(D).** 3

Q. No. 15 $3 \, Sin\, \alpha - 4 \, Sin^3 \alpha$ =

(A). $Sin\, \alpha$ **(B).** $Sin\, 2\alpha$

(C). $Sin\, 3\alpha$ **(D).** $Sin\, 4\alpha$

Q. No. 16 If Sin α > 0 and Tan α > 0 then terminal side lies in ……. Quadrant.

(A). I   **(B).** II

(C). III   **(D).** IV

Q. No. 17 If a, b, c are sides of triangle and s = $\frac{a+b+c}{2}$ then area of triangle is:

(A). $\sqrt{s(s-a)}$ **(B).** $\sqrt{s(s-b)}$

(C). $\sqrt{s(s-c)}$ **(D).** $\sqrt{s(s-a)(s-b)(s-c)}$

Q. No. 18 If the shadow of the building is 100 m long when angle of elevation 45°, the height of building is:

(A). 200   (B). 150
(C). 100   (D). 50

Q. No. 19 The radian measure of angle at the centre of a circle of radius 12cm which cuts off an arc 24cm long is:

(A). 2 *rad*   (B). 1 *rad*
(C). 1/2 *rad*   (D). 1/3 *rad*

Q. No. 20 All and sundry [select the correct meaning]

(A). *Everybody without distinction*   (B). *Only rich person*
(C). *Together*   (D). *Selected people*

Q. No. 21 Electric field between the plates of a capacitor is 80 N/C. The electric field between plates when it is immersed in water will be:

(A). 1 *N/C*   (B). 80 *N/C*
(C). 6400 *N/C*   (D). 40 *N/C*

Q. No. 22 A wire 'A' has a length half that of wire 'B' of the same material. The resistance ratio between 'A' and 'B' will be:

(A). 1:1   (B). 1:2
(C). 1:4   (D). 1:8

Q. No. 23 Direction of induced e.m.f is such that it opposes the cause which produces it, is called:

(A). *Faraday's law*   (B). *Lenz's*
(C). *Ampere's law*   (D). *Newton's law*

Q. No. 24 When solenoid is bent into circle it becomes:

(A). *Transformer*   (B). *Toroid*
(C). *Resistor*   (D). *Capacitors*

Q. No. 25 A potentiometer is used to measure:

(A). *Resistance*   (B). *Current*
(C). *Potential*   (D). *Charge*

Q. No. 26 Wheatstone bridge is used to:

(A). Compare resistance

(B). Find current

(C). Determine voltage

(D). Determine more than one resistance

Q. No. 27 Which one of the following are not electromagnetic waves?

(A). Infrared waves

(B). Ultaviolet waves

(C). Radar waves

(D). Sound waves

Q. No. 28 Electromagnetic waves transmitted by an antenna have frequency of the order of:

(A). $10^{12}\ Hz$

(B). $10^{10}\ Hz$

(C). $10^{8}\ Hz$

(D). $10^{6}\ Hz$

Q. No. 29 Tumors are irradiated by:

(A). electrons

(B). γ rays

(C). α rays

(D). β rays

Q. No. 30 As citizen we should be concerned _____ national peace.

(A). upon

(B). for

(C). about

(D). at

Q. No. 31 According to Heisenberg uncertainty principle we cant's measure simultaneously:

(A). Energy and position

(B). Momentum and time

(C). Momentum and position

(D). Time and position

Q. No. 32 Laws of physics may be expressed in the same set of equations for all frames of references which are:

(A). Accelerated

(B). not accelerated

(C). at rest or moving with variable velocity

(D). moving with constant speed

Q. No. 33 The intensity of x-ray depends on:

(A). number of electrons

(B). number of photons

(C). number of protons

(D). None of these

Q. No. 34 If S contains n elements then power set of S, P(s) contains elements, which are:

(A). 2^{n}

(B). 4^{n}

(C). 5^{n}

(D). 6^{n}

Q. No. 35 The set of rational numbers between 5 and 9 is:

(A). *Finite*

(B). *Infinite*

(C). {5,6,7,8,9}

(D). {6,7,8}

Q. No. 36 The value of determinant of the matrix $\begin{bmatrix} 1 & 3 & 5 \\ 7 & 9 & 11 \\ 13 & 15 & 17 \end{bmatrix}$ is:

(A). 0

(B). 1

(C). 2

(D). 3

Q. No. 37 If $\begin{bmatrix} 6 & \lambda \\ 3 & 2 \end{bmatrix}$ is singular matrix, then $\lambda =$

(A). 4

(B). -4

(C). 12

(D). 18

Q. No. 38 In the quadratic equation $ax^2 + bx - c = 0$, the sum of roots is:

(A). $-b/c$

(B). $-b/a$

(C). $-c/a$

(D). a/c

Q. No. 39 The roots of quadratic equation $x^2 - 4x = 0$ are:

(A). *Imaginary*

(B). *Rational and different*

(C). *Irrational*

(D). *Rational and equal*

Q. No. 40 He said to me, "I don't believe you." [Change to indirect speech]

(A). *He asked me he didn't believe me*

(B). *He said he didn't believe me*

(C). *He declared that I didn't believe him*

(D). *He told me that I don't beleive him*

Q. No.41 Physical quantities are often divided into _____ categories.

(A). *Two*

(B). *Three*

(C). *Four*

(D). *None of these*

Q. No. 42 Which of the following is not a derived quantity?

(A). *Velocity*

(B). *Density*

(C). *Intensity of light*

(D). *Pressure*

Q. No. 43 Scalar is a physical quantity which is completely described by a:

(A). *Number only*

(B). *Direction only*

(C). *Number with proper unit*

(D). *Number with direction*

Q. No. 44 The vector in space has:

(A). Two components   (B). Three components
(C). Four components   (D). None of these

Q. No. 45 If a body of mass of 2kg is raised vertically through 2m, then the work done will be:

(A). 38.2 J   (B). 36.2 J
(C). 39.2 J   (D). 392.2 J

Q. No. 46 Radian is defined as the angle subtended at the centre of a circle by an arc of length:

(A). Equal to its radius   (B). Equal to double its radius
(C). Equal to 2.5 times its radius   (D). None of these

Q. No. 47 The current produced by moving a loop of wire across a magnetic field is called:

(A). Direct current   (B). Alternating current
(C). Magnetic current   (D). Induced current

Q. No. 48 Mathematical expression for first condition of equilibrium is:

(A). $\sum Fx = 0$ (B). $\sum Fx = 0 \ and \ \sum Fy = 0$
(C). $\sum Fx = 0 \ OR \ \sum Fy = 0$ (D). $\sum Fy = 0$

Q. No. 49 The speed of a rotary lawn mower is increased from 50 rev/hr to 150 rev/hr in 2sec. Its angular acceleration will be:

(A). $50 \ rev/min^2$ (B). $100 \ rev/min^2$
(C). $150 \ rev/min^2$ (D). $200 \ rev/min^2$

Q. No. 50 She looked right at me, or I should say right _____ me.
(A). towards   (B). across
(C). into   (D). through

Q. No. 51 The angular speed of second's hand of a watch is:

(A). rad/sec   (B). $\frac{\pi}{60}$ rad/sec
(C). $\frac{\pi}{30}$ rad/sec   (D). $2\pi \ rad/sec$

Q. No. 52 A uniform rod is 50cm long. If a 10N weight is hanged at 10cm from the left end then where should a 15N weight be hanged from the right end to keep it in equilibrium?

(A). 10 cm   (B). 15 cm
(C). 5 cm   (D). 20 cm

Q. No. 53 The bob of a simple pendulum is a hollow sphere with a hole at the bottom. The bob is filled with mercury and when it vibrates the mercury flows out slowly from the bob. Its time period will:

(A). Increase
(B). Decrease
(C). First increse then decrease
(D). Not be effected

Q. No. 54 For checking the quality of crystals we use:

(A). Diffraction light
(B). Plane polarized light
(C). Refracted light
(D). Reflected light

Q. No. 55 Final image formed by a compound microscope is:

(A). Real and erect
(B). Real and invert
(C). Virtual and erect
(D). Virtual, inverted and magnified

Q. No. 56 Physical process in which heat is neither lost nor gained from the system is called:

(A). Entropy
(B). Isothermal
(C). Adiabatic
(D). Isochoric

Q. No. 57 The volume of the gas is 1.6 litres and pressure is 2 atm at constant temperature. If the volume is halved, the pressure will be:

(A). 1 atm
(B). 2 atm
(C). 4 atm
(D). 8 atm

Q. No. 58 Which one of the following is a best conductor for electricity?

(A). Zinc
(B). Silver
(C). Aluminium
(D). Wet air

Q. No. 59 Two similar capacitors are first connected in parallel and then in series. The capacities in the two cases are in the ratio:

(A). 1 : 4
(B). 1 : 2
(C). 2 : 1
(D). 4 : 1

Q. No. 60 He asked me to bring a chair and sit _____ him.

(A). next to
(B). besides
(C). towards
(D). among

Q. No. 61 AMICABLE [Choose the exact opposite]

(A). Indispensable   **(B).** Inimical

(C). Hostile   **(D).** Applicable

Q. No. 62 DEJECTION [Choose the exact opposite]

(A). Elation   **(B).** Privation

(C). Disappointment   **(D).** Salvation

Read the passage given below and select the correct answers to the questions on the basis of what is stated or implied. **(Q.Nos. 63, 64, 65)**

Passage: Cultivated people are a drop of ink in the ocean. They mix easily and even genially with other drops, for those exclusive days are over when cultivated people only made cultivated friends and became tongue-tied or terror struck in the presence of any one whose make-up was different from their own.

Q. No. 63 Author is comparing cultivated people with a drop of ink in the ocean because of their:

(A). intermingling disposition   **(B).** superiority in influence

(C). refinement and improvement of mind   **(D).** comparatively negligible number

Q. No. 64 The word 'cultivated' implies:

(A). subjected to cultivation   **(B).** improved by cultivation

(C). refined and cultured   **(D).** well groomed

Q. No. 65 The contextual meaning of 'makeup' in the last sentence is:

(A). disguise of character   **(B).** physique of a person

(C). person's moral character   **(D).** physical or mental constitution

Q. No. 66 In the reaction $4Al + 3O_2 \rightarrow 2 Al_2O_3$, if the amount of Al taken is 1/4 moles, how many moles of O_2 are required?

(A). 1/3 moles   **(B).** 2/3 moles

(C). 4/3 moles   **(D).** 3/16 moles

Q. No. 67 Which of the following elements present in a compound cannot be determined by combustion analysis?

(A). oxygen   **(B).** hydrogen

(C). carbon   **(D).** all of the above

Q. No. 68 Under what conditions a gas is most ideal?

(A). low temperature & low pressure   (B). high temperature & high pressure
(C). low temperature & high pressure   (D). high temperature & low pressure

Q. No. 69 Which of the following is a coloured gas?

(A). HCl (B). $HOCl$
(C). Cl_2 (D). HBr

Q. No. 70 Which of the following liquid is the most volatile?

(A). Pentane   (B). Petrol
(C). Water   (D). Glycerine

Q. No. 71 Molecular crystals have:

(A). low melting point   (B). high density
(C). high melting point   (D). low vapour pressure

Q. No. 72 The magnetic quantum number specifies:

(A). spin of electron   (B). size of orbital
(C). shape of orbital   (D). orientation of orbital

Q. No. 73 Which of the following has no permanent dipole moment?

(A). CCl_4 (B). $C_2H_4Cl_2$
(C). $CHCl_3$ (D). $CH_3 - O - CH_3$

Q. No. 74 Which of the following is the weakest bond?

(A). Covalent bond   (B). Ionic bond
(C). $H -$ bond   (D). Coordinate covalent bond

Q. No. 75 The enthalpy change, ΔH for an endothermic process is:

(A). zero   (B). negative
(C). positive   (D). unity

Q. No. 76 Which of the following has the highest entropy?

(A). Steam   (B). Water
(C). Solid NaCl   (D). Liquid NaCl

Q. No. 77 Electric energy is converted into chemical energy in:

(A). electrochemical cell   (B). electrolytic cell
(C). dry cell   (D). all of the above

Q. No. 78 The first element of any period has:

(A). the largest size   (B). the smallest size
(C). highest electro – negativity   (D). non – metallic nature

Q. No. 79 Potassium salt when placed in Bunsen flame imparts which colour to the flame?

(A). Blue   (B). Green
(C). Violet   (D). Red

Q. No. 80 The element Zn reacts with cold and very dilute HNO_3 to evolve:

(A). N_2 gas   (B). NO gas
(C). N_2O gas   (D). NO_2 gas

Q. No. 81 The Range of the binary relation $4x^2 + 9y^2 = 36$ is:

(A). $[-2,2]$ (B). $[-3,3]$
(C). $[2,2]$ (D). None of these

Q. No. 82 If A(0,0), B(3,0) and C(0,3) are the vertices of a triangle, then co-ordinates of its centroid is:

(A). (1,1)   (B). (0,1)
(C). (3,3)   (D). (3/2,3/2)

Q. No. 83 The point of intersection of the lines $3x + 4y = 0$ and $5x – 6y = 0$ is:

(A). (3,4)   (B). (5,−6)
(C). (3,5)   (D). (0,0)

Q. No. 84 The slope of the tangent to the curve $y = x^3 + 5$ at the point (1,2) is:

(A). 6   (B). 2
(C). 5   (D). 3

Q. No. 85 The derivative of $[\sec^{-1} x + \csc^{-1} x]$ is equal to:

(A). $\dfrac{1}{x\sqrt[x]{x^2-1}}$

(B). $\dfrac{1}{1+a^2}$

(C). 0

(D). $\dfrac{1}{\sqrt{x^2-1}} - \dfrac{1}{\sqrt{x^2+1}}$

Q. No. 86 If $x = 2\cos^2 \Theta$, $y = 4\sin^2 \Theta$ then dy/dx is equal to:

(A). -2

(B). 2

(C). -4

(D). 4

Q. No. 87 The function $f(x) = 5x^2 - 6x + 2$ has a minima at:

(A). $x = 3$

(B). $x = 5$

(C). $x = 3/5$

(D). $x = -3/5$

Q. No. 88 The value of $\int Sinx\, Cos\alpha\, dx$ is:

(A). $(Sinx)^2/2$

(B). $(Sinx)^2/2 + C$

(C). $-Cosx\, Cos\alpha + C$

(D). $Cosx\, Cos\alpha + C$

Q. No. 89 The value of $\int_3^3 (x^3 + 3x^2 + 2x + 1)\, dx$ is:

(A). 27

(B). 54

(C). 52

(D). 0

Q. No. 90 He was reading the books. [Change the voice]

(A). *Books was being read by him.*

(B). *Books are being read by him.*

(C). *Books were being read by him.*

(D). *Books have being read by him.*

Q. No. 91 If the velocity of a particle moving in a straight line is given by $v = 3t^2$ then the distance travelled by it in the first 'T' seconds is:

(A). $3t^3 + C$

(B). $t^3 + C$

(C). $3t^2 + C$

(D). $T^3 + C$

Q. No. 92 The equation $3x^2 - 4xy + 5y^2 = 0$ is called:

(A). *Quadratic*

(B). *Linear*

(C). *Explicit*

(D). *Homogeneous*

Q. No. 93 The radius of the circle represented by the equation $x^2 + 2x + 1 + y^2 + 4y + 4 = 16$, is:

(A). 16
(B). 8
(C). 11
(D). 4

Q. No. 94 The equation of the tangent to the circle $x^2 + y^2 = 8$ at the point $(2, 2)$ is:

(A). $2x + 2y = 8$
(B). $x - y = 4$
(C). $x + y = 2$
(D). $2x + y = 4$

Q. No. 95 Locus of points in a plane, the distance of each of which from a fixed point is greater than its distance from a fixed line in the plane is called:

(A). a circle
(B). a parabola
(C). an ellipse
(D). a hyperbola

Q. No. 96 The equation of the latus rectum of the parabola $(x + 1)^2 = 4 (y - 2)$ is:

(A). $y - 3 = 0$
(B). $y = -3$
(C). $x = 3$
(D). $x = -3$

Q. No. 97 In an ellipse the midpoint C of the major axis is called:

(A). the centre of the ellipse
(B). focus of the ellipse
(C). vortex of the ellipse
(D). second focus

Q. No. 98 EXTRICATE [Select the word nearest in meaning]

(A). Relief
(B). Indulge
(C). Free
(D). Extrinsic

Q. No. 99 LUCID [Select the word nearest in meaning]

(A). Conclusive
(B). Unclear
(C). Easily understand
(D). Disruptive

Q. No. 100 I shall write letters. [Change the voice]

(A). Letters will been written by me.
(B). Letters will be being written by me.
(C). Letters would be written by me.
(D). Letters will be written by me.