

INSTITUTE OF ENGINEERING

Model Entrance Exam

(Set-1)

Instructions:

There are 100 multiple-choice questions, each having four choices of which only one choice is correct.

Section-A (1 marks)

- 1) More than one student _____ expelled.
a) was b) were c) are d) have been
- 2) We postponed _____ the meeting.
a) to attend b) attended c) attends d) attending
- 3) I _____ to Chitwan yet.
a) haven't been b) have been c) had been d) been
- 4) He talked about the competition as if he _____ part in it.
a) had taken b) took c) takes d) has taken
- 5) Please stand _____ line for the tickets.
a) at b) by c) with d) in
- 6) I have made a mess of all my answers.
a) use time resourcefully b) to get the advantage of
c) to confuse d) to end
- 7) He said, "I bought a car yesterday."
a) He said that she had bought a car the previous day.
b) He told me that he had bought a car the previous day.
c) He said that he has bought a car the previous day.
d) He said that he had bought a car the previous day.
- 8) Tainted (Synonym)
a) enhance b) strengthen c) defect d) disgrace
- 9) I have to change my approach; the competition is too good now. The word 'competition' has a stress primarily on its _____ syllable.
a) first b) second c) third d) fourth
- 10) Manifest (Antonym)
a) apparent b) obscure c) visible d) noticeable
- 11) I was blamed _____ the mistake.
a) for b) by c) with d) in
- 12) Transform the given sentence into negative:
"Many people want to travel the world"
a) Not many people want to travel the world.
b) Don't many people want to travel the world?
c) Many people don't want to travel the world.
d) Many people want to travel the world, isn't it?
- 13) $\lim_{x \rightarrow 9} \frac{x^3 - 27}{x - 9} =$
a) 3/2 b) 9/2 c) 2/3 d) 1/3
- 14) If $y = \tan^{-1}(\cot x) + \cot^{-1}(\tan x)$, then $\frac{dy}{dx}$ equals:
a) 1 b) 0 c) -1 d) -2
- 15) The greatest value of $f(x) = x^3 - 12x^2 + 45x$ in $[0, 7]$ is:
a) 54 b) 70 c) 36 d) 58
- 16) $\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx =$
a) $\log(\cos x + \sin x) + c$ b) $x + c$
c) $\log x + c$ d) $\sqrt{1 + \sin 2x} + c$
- 17) Both roots of the equation $ax^2 + bx + c = 0$, $a \neq 0$ are zero if:
a) $c = 0, b = 0$ b) $b = 0, c \neq 0$
c) $b \neq 0, c = 0$ d) $b \neq 0, c \neq 0$

- 37) Gravitational force is required for
a) stirring of liquid
b) convection
c) conduction
d) diffraction and diffusion
- 38) Moment of inertia depends on
a) Torque
b) axis of rotation
c) Angular acceleration
d) Angular velocity
- 39) Liquid drops acquire spherical shape due to
a) gravity
b) surface tension
c) viscosity
d) intermolecular attraction
- 40) Two blocks of ice when pressed together join to form one block because:
a) of heat produced during pressing
b) of cold produced during pressing
c) melting point of ice decreases with increase in pressure
d) melting point of ice increases with increase in pressure
- 41) The internal energy of a gram-molecule of an ideal gas depends upon
a) pressure alone
b) volume alone
c) temperature alone
d) both pressure and temperature
- 42) Water in a pond is heated by sunlight. The temperature of water increases from top to bottom through:
a) conduction
b) convection
c) radiation
d) all of these
- 43) Sound waves do not show the phenomenon of
a) refraction
b) interference
c) diffraction
d) polarization
- 44) When a ray of light enters a glass slab from air
a) its wavelength decreases
b) its wavelength increases
c) its frequency increases
d) neither the wavelength nor frequency changes
- 45) If a unit charge is taken from one point to another over an equipotential surface, then
a) work is done on the charge
b) work is done by the charge
c) work on the charge is constant
d) no work is done
- 46) Eddy current is produced in
a) heated magnetic field
b) non-uniform magnetic field
c) uniform magnetic field
d) changing electric field
- 47) In NPN transistor electron moves from
a) base to emitter
b) collector to emitter
c) base to collector
d) emitter to base
- 48) The minimum wavelength of X-rays can be obtained by
a) increasing filament voltage
b) increasing potential between anode and cathode
c) increasing intensity of X-rays
d) changing target material
- 49) Line of force due to earth's horizontal magnetic field are:
a) concentric circles
b) curved lines
c) elliptical
d) parallel and straight
- 50) Isobars have same number of
a) electrons
b) protons
c) neutrons
d) nucleons
- 51) Number of moles of solute dissolved in one kilogram of solvent is called
a) Normality
b) Molarity
c) Molality
d) Molecularity
- 52) A subshell with $n=6, l=2$ can accommodate a maximum of
a) 12 electrons
b) 14 electrons
c) 10 electrons
d) 6 electrons
- 53) In the reaction which one is reduced?
 $\text{Cr}_2\text{O}_7 + \text{H}^+ + \text{I}^- \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O} + \text{I}_2$
a) Cr
b) H^+
c) O
d) I

- 54) BF_3 is
a) Lewis acid b) Lewis base c) Bronsted acid d) Bronsted base
- 55) Nitrogen cannot form pentahalides because of
a) high electronegativity b) no d-orbitals
c) small size d) high electron affinity
- 56) In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with
a) FeS b) CO c) Cu_2S d) SO_2
- 57) The solubilities of carbonates decrease down the Magnesium group due to decrease in
a) Lattice energy of solids b) Hydration energies of cation
c) Inter ionic attraction d) Enthalpy of solution formation
- 58) Which of the following is used in galvanizing iron sheet?
a) Zn b) Hg c) Cu d) Ni
- 59) The displacement of electrons of σ bond towards an electronegative atom or group of atoms is
a) mesomeric effect b) inductive effect
c) electromeric effect d) delocalization effect
- 60) Which of the following compounds cannot be synthesized by the Wurtz reaction?
a) Ethane b) Butane c) Hexane d) Methane

Section-B (2 marks)

Read the following passages and answer the questions given below.

When the esteemed Greek philosopher, Eudemos, became ill with a fever, the most famous physician of Rome tried every remedy but to no avail. Death was knocking at his door when Eudemos called in Galen, a young Greek physician who had recently arrived in the city.

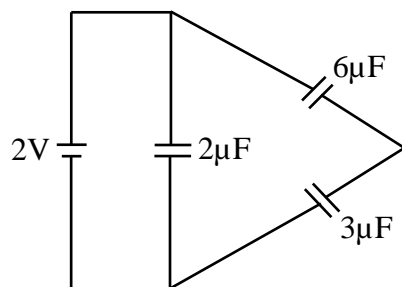
The roman doctors attending Eudemos scoffingly asked the new-comer. "To what physician's sect do you belong?" Galen, not to be intimidated, boldly answered: "I belong to no sect, and regard as slaves those who accept as final, the teachings of Hippocrates or anyone else." He then proceeded to prescribe remedies that restored his patient to perfect health within a short time.

Galen was born in 130 AD in Pergamon, the capital of the Roman province of Asia minor, famous for its school of sculpture and for its library which rivalled that of Alexandria. Nicon, the father of Galen, was a wealthy farmer who had attained a well-rounded education in mathematics, philosophy and the natural sciences. Nicon instilled in his son a love for language and literature, and trained him in the fundamental of mathematics and the natural sciences. On the farm, the impressionable boy learned many of the secrets of animal and plant life. When he was fourteen years old, Galen was sent by his father to the best teacher in Pergamon. From reading Aristotle he received his first lessons in biology and learned that the biologist must study nature by direct observation.

- 61) Who tried to belittle Dr Galen?
a) his father b) his teachers c) Eudemos d) Roman physicians
- 62) According to Galen who is to be called a slave?
a) one who belongs to a school of thought
b) the followers of Hippocrates
c) a blind follower of any theory or therapy
d) seriously ill Roman philosopher
- 63) Which of the following statements about Nicon is NOT TRUE in the context of the passage?
a) He was reading at Alexandria.
b) He was a lover of literature.
c) He was a well-to-do farmer.
d) He wanted to give good education to his son.

- 64) Galen learned much about the secrets of nature from
 a) Aristotle b) Nicon c) Eudemos d) Hippocrates
- 65) $\lim_{x \rightarrow 0} \frac{\sin x + \log(1-x)}{x^2} =$
 a) 0 b) 1/2 c) -1/2 d) does not exist
- 66) If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, then $\frac{dy}{dx}$ is equal to:
 a) $\frac{x}{y}$ b) $\frac{y}{x}$ c) $-\frac{x}{y}$ d) $-\frac{y}{x}$
- 67) If the rate of change of a sine of an angle θ is k, then rate of change of the tangent of that angle is:
 a) k b) $\frac{1}{k^2}$ c) $\frac{1}{k}$ d) $\frac{1}{k^3}$
- 68) $\int \frac{\cos 2x-1}{\cos 2x+1} dx =$
 a) $\tan x - x + c$ b) $x + \tan x + c$ c) $x - \tan x + c$ d) $-x - \cot x + c$
- 69) The area of the region bounded by $y = 2x - x^2$ and the x-axis is:
 a) 8/3 b) 4/3 c) 7/3 d) 2/3
- 70) The third term in the expansion of $(x^2 - \frac{1}{x^3})^n$ is independent of x, then n =
 a) 2 b) 3 c) 4 d) 5
- 71) If the sum of infinite terms of GP is 3 and the sum of squares of these terms is $\frac{9}{2}$, then the sum of their cubes will be:
 a) $\frac{108}{13}$ b) $\frac{105}{13}$ c) $\frac{103}{13}$ d) $\frac{109}{14}$
- 72) The value of the determinant $\begin{vmatrix} x+1 & x+2 & x+4 \\ x+3 & x+5 & x+8 \\ x+7 & x+10 & x+14 \end{vmatrix}$ is:
 a) -2 b) 2 c) 4 d) 0
- 73) Let $f(x) = \frac{x}{1-x}$, $x \neq 1$, then range of f is:
 a) $(-\infty, \infty)$ b) $(-1, \infty)$ c) $(-\infty, -1)$ d) $(-\infty, -1) \cup (-1, \infty)$
- 74) The distance between the pair of parallel lines $x^2 + 2xy + y^2 - 8ax - 8ay - 9a^2 = 0$ is:
 a) 10a b) $5\sqrt{2}a$ c) $2\sqrt{5}a$ d) $\sqrt{10}a$
- 75) If a circle passes through the points of intersection of the co-ordinate axes with the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$. Then the value of λ is:
 a) 2 b) 4 c) 6 d) 3
- 76) If the latus rectum of hyperbola be 8 and eccentricity be $\frac{3}{\sqrt{5}}$, then equation of hyperbola is:
 a) $4x^2 - 5y^2 = 100$ b) $5x^2 - 4y^2 = 100$
 c) $4x^2 - 6y^2 = 100$ d) $5x^2 - 8y^2 = 100$
- 77) Equation of plane parallel to the plane $x - 2y + 2z = 5$ which is at unit distance from point (1,2,3) is:
 a) $x - 2y + 2z = 6$ b) $x - 2y + 2z + 3 = 0$
 c) $x - 2y + 2z + 6 = 0$ d) $x - 2y + 2z = 3$
- 78) The smallest positive angle satisfying the equation $\sin^2\theta - 2\cos\theta + \frac{1}{4} = 0$ is:
 a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$
- 79) In a ΔABC , if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and the side a=2, the area of triangle is:
 a) 1 b) 2 c) $\sqrt{3}$ d) $\frac{\sqrt{3}}{2}$
- 80) A body thrown upward with some velocity reaches the maximum height of 50m. Another body with double the mass thrown up with double the initial velocity will reach a maximum height of
 a) 100m b) 200m c) 300m d) 400m
- 81) Two bodies are projected at angles θ and $(90^\circ - \theta)$ to the horizontal with the same speed. The ratio of their time of flight is
 a) 1:1 b) $\tan \theta:1$ c) $1:\tan \theta$ d) $\tan^2\theta:1$

- 82) A person with his hands in his pocket is skating on ice at the rate of 10 m/s and describes a circle of radius 50 m. What is his inclination to the vertical?
 a) $\tan^{-1}(1/2)$ b) $\tan^{-1}(1/5)$ c) $\tan^{-1}(3/5)$ d) $\tan^{-1}(1/10)$
- 83) A spherical solid ball of mass 1 kg and radius 3 cm is rotating about an axis passing through its centre with an angular velocity of 50 radian/second. The kinetic energy of rotation is
 a) 4500 J b) 90 J c) 910 J d) 0.45 J
- 84) The mass of a moon is $(1/81)$ of earth's mass and radius is $(1/4)$ that of the earth. If the escape velocity from the earth's surface is 11.2 km/s, what will be its value at the moon?
 a) 22.4 km/s b) 11.2 km/s c) 2.5 km/s d) 8 km/s
- 85) A vessel contains a liquid (density 1.2 g/cc) over mercury (density 13.5 g/cc). A homogenous sphere floats with one-third of its volume immersed in mercury and the other two-third in liquid. The density of the material of the sphere in g/cc is:
 a) 7.3 b) 9.4 c) 5.3 d) 14.7
- 86) Two marks on the glass rod 10 cm apart are found to increase their distance by 0.08 mm when the rod is heated from 0°C to 100°C . A flask made of the same glass as that of rod measures a volume of 1000 cc at 0°C . The volume it measures at 100°C in cc is
 a) 1002.4 b) 1004.2 c) 1006.4 d) 1008.4
- 87) The molecular weight of a gas is 44. The volume occupied by 2.2 g of this gas at 0°C and 2 atmospheric pressure will be:
 a) 2.8 litre b) 0.56 litre c) 5.6 litre d) 44.8 litre
- 88) A sound source is moving towards stationary listener with $(1/10)^{\text{th}}$ the speed of sound. The ratio of apparent to real frequency is
 a) $\frac{11}{10}$ b) $\left(\frac{11}{10}\right)^2$ c) $\left(\frac{9}{10}\right)^2$ d) $\frac{10}{9}$
- 89) A ray of light passes from vacuum into a medium of refractive index μ , the angle of incidence is found to be double the angle of refraction. The angle of incidence is:
 a) $\cos^{-1}(\mu/2)$ b) $2\cos^{-1}(\mu/2)$ c) $2\sin^{-1}(\mu)$ d) $2\sin^{-1}(\mu/2)$
- 90) An equiconvex lens has a power of 5 dioptre. If it is made of glass of refractive index 1.5, what is the radius of curvature of each surface?
 a) 10 cm b) 20 cm c) 30 cm d) 5 cm
- 91) The total energy stored in the capacitor system shown in figure will be:



- a) 8 µJ b) 16 µJ c) 2 µJ d) 4 µJ
- 92) A series LCR circuit with $R = 20 \Omega$, $L = 1.5 \text{ H}$ and $C = 35 \mu\text{F}$ is connected to a variable-frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, what is the average power transferred to the circuit in one complete cycle?
 a) 200 W b) 1000 W c) 100 W d) 2000 W
- 93) The maximum K.E of the electrons emitted from metallic surface of $1.6 \times 10^{-19} \text{ J}$ when frequency of incident radiation is $7.5 \times 10^{14} \text{ Hz}$. Calculate the minimum frequency of radiation for which electron will be emitted.
 a) $5.075 \times 10^{14} \text{ Hz}$ b) $8.9 \times 10^{14} \text{ Hz}$
 c) $8.9 \times 10^{15} \text{ Hz}$ d) $4.99 \times 10^{14} \text{ Hz}$

