IOE MODEL TEST-2074

TIME: 2 HRS **FULL MARKS: 140**

RED INDICATES CORRECT ANSWERS.

MATHS-I(10 X 1=10)

1. If $A = \{(x,y): x^2+y^2=5\}$ & $B = \{(x,y): 2x=5y\}$ then, $n(A \cap B) = ?$
   a. 0 b. 1 **c. 2** d. 4
2. The range of $\frac{x-2}{|x-2|}$, $x \neq 2$ is:
   a. {-1,1} b. {1} c. [-1,1] d. (-1,1)
3. The no. of tangents that can be drawn from $(1, \sqrt{2})$ to the circle $x^2+y^2=4$ is/are:
   a. 3 b. 2 c. 1 **d. 0**
4. $\int_{-1}^{1} sin^7 x \, dx = ?$
   a. 1 b. ½ **c. 0** d. 2
5. $\lim_{x \to \infty} \left(\frac{\sin x}{x}\right) =$
   a. 0 b. 1 c. -1 d. doesn't exist
6. $\lim_{n \to 0} \frac{5^n-1}{4^n-1} = ?$
   a. $\log_4 5$ b. $\log_5 4$ c. $\log_5 3$ d. $\log_3 5$
7. Equation $x^2+xy+y^2 = 0$ represents a pair of:
   a. real and distinct lines b. real and co-incident lines
   c. real and parallel lines **d. imaginary lines**
8. $\vec{a}$ and $\vec{b}$ are unit vectors inclined at angle α then, $|\vec{a} - \vec{b}|$ is:
   a. $2\cos\alpha/2$ b. $2\tan\alpha/2$ **c. $2\sin\alpha/2$** d. $\sin\alpha/2$
9. 3 prizes are to be distributed among 6 people. The no. of ways such that no person gets all the prizes is:
   a. 120 **b. 210** c. 216 d. 64
10. The value of i^i is:
    a. 0 **b. $e^{-\pi/2}$** c. $e^{\pi/2}$ d. $e^{i\pi/2}$

PHYSICS-I(10 X 1=10)

1. The dimensional formula of magnetic flux is:
   a. $[ML^2T^{-2}A^{-1}]$ b. $[ML^0T^{-2}A^{-2}]$ c. $[M^0L^{-2}T^2A^{-2}]$ d. $[ML^2T^{-1}A^3]$
2. If two satellites of different masses are revolving in the same orbit, they have same
   a. Speed b. Energy c. Angular momentum d. Linear momentum
3. A body is falling freely under gravity. The distance covered by the body in first, second and third minutes of its motion are in the ratio of:
   a. 1:4:9 b. 1:2:3 **c. 1:3:5** d. 1:5:6
4. The high thermal conductivity of metal is due to free electrons. The relevant electron property is:
   a. Its being charged b. High average energy **c. High average thermal speed**
   d. Low volume
5. A load is suspended on a wire of length 'l' and stress and strain are calculated. The Young's modulus was calculated to be 'Y'. For wire of length '2l' its value would be:
   a. 2Y **b. Y** c. ½ Y d. 4Y
6. A particle of mass 'm' carrying charge q is kept at rest in uniform electric field E and released. The kinetic energy gained by particle, when it moves through a distance of y is:
   a. $\frac{1}{2} qEy^2$ **b. qEy** c. qEy^2 d. qE^2y
7. A person uses spectacles of power +2D. He is suffering from:

a. Myopia **b. Hypermetropia** c. Astigmatism d. Persbiopia

8. **The densities of gases in two identical containers are in the ratio 1:2. If the rms velocities of molecules are in the ratio 2:1, the ratio of pressure exerted in two containers is:**
   a. 2:1 b. 1:2 c. 4:1 d. 1:1
9. **The acceleration of a particle in SHM at its maximum displacement position is:**
   a. 0 b. minimum **c. maximum** d.none
10. **The tension in a sonometer wire is increased nine times. The fundamental frequency of vibration becomes:**
    a. 9 times **b. 3 times** c. $\frac{1}{3}$ times d. $\frac{1}{9}$ times

CHEMISTRY-I(12 X1=12)

1. **How many electrons are needed to balance the equation?**
   $NO_3+H_2O+e^- \rightarrow NH_3+OH$
   a. 6 b. 5 **c. 8** d. 4
2. **The number of unpaired electrons in Mn^{++} ion is**
   a. 4 b. 6 **c. 5** d. 3
3. **The species which is amphiprotic is**
   a. HCl b. NH_2^- **c. HSO_4^-** d. H_2SO_4
4. **1M NaCl and 1M HCl are present in a solution. The solution is:**
   a. Not a buffer solution with pH<7 b. Not a buffer solution with pH>7
   c. A buffer solution with pH<7 d. A buffer solution with pH>7
5. **Stability of ionic compounds is due to**
   a. Electronegativity **b. Lattice energy** c. Dipole moment d. Electron affinity
6. **Ionic product of water will increase if**
   a. Pressure is decreased b. H^+ are added c. OH^- are added **d. Temperature is increased**
7. **Malachite is an ore of**
   a. Zn **b. Cu** c. Fe d. Na
8. **Which of the following are recycled in the manufacture of Na_2CO_3**
   a. $CaCl_2$ and CaO b. CO_2 and NH_4Cl c. NaCl and CaO **d. NH_3 and CO_2**
9. **The colored gas is**
   a. NO_2 b. NO c. N_2O d. N_2O_4
10. **When Cl_2 is reacted with hot and conc. NaOH, the product formula is**
    a. NaCl + NaClO **b. NaCl + $NaClO_3$** c. NaClO + $NaClO_3$ d. $NaClO_3$
11. **Which of the following compound has maximum covalent character?**
    a. $AlCl_3$ b. AlH_3 c. MgI_2 d. NaI
12. **Crude glycerin is purified by**
    a. Sublimation **b. Vacuum distillation** c. Chromatography d. Solvent extraction

ENGLISH-I(14 X 1=14)

1. **The word "Function" has stress on the ___ syllable**
   a. First b. Second c. Third d. none
2. **There are ___ consonant sounds in English.**
   a. 20 b. 21 **c. 24** d. 26
3. **The antonym of 'gaiety' is .....**
   a. Nadir b. Meagre c. Hope **d. Melancholy**
4. **The synonym of 'belittle' is .....**
   a. Small **b. Mock** c. Praise d. Rage

5. The committee _____ divided in their opinion.
   a. was **b. were** c. is d. none
6. This is one of the best books that _____ available on the market.
   a. is b. was **c. were** d. are
7. The flags waved _____ our heads.
   a. above b. over **c. both a and b** d. none
8. We travelled to pokhara _____ bus.
   a. on **b. by** c. from d. through
9. The passive of 'There is no time to waste' is
   a. There is no time to have been wasted. **b. There is no time to be wasted.**
   c. Time should not be wasted. d. None
10. _____ dog is a faithful animal.
    a. A b. An **c. The** d. None
11. If I were you, I _____ this agreement.
    a. would not sign b. would not have signed c. will have signed d. None
12. Both the man and his car _____ now came into sight were in a miserable condition.
    a. who **b. that** c. which d. None
13. The farmer had his cows _____.
    a. graze b. to graze c. grazed d. None
14. As I was walking down the road, I heard someone calling me. This sentence is
    a. simple b. compound **c. complex** d. Mixed

ENGINEERING APTITUDE TEST- I(14 X 1 = 14)

1. For cement OPC stands for:
   a. Ordinary Portland Cement b. Other Portland Cement c. Other Pozzolana Cement
   d.Other Particle Cement
2. Weight of 1 bag cement is:
   a. 25 Kg b. 35 Kg **c. 50 Kg** d.100Kg
3. With the help of _____ the charge is ignited in petrol engine.
   a. Fuel injector **b. Spark plug** c. Carburetor d. None of above
4. The power available at the shaft of an IC engine is known as:
   a. Break Horse Power(BHP) b. Indicated Horse Power(IHP) c. Frictional Horse Power(FHP)
   d. None of above
5. CDMA stands for:
   a. Code Division Multiple Access b. Current Data Manage Access
   c. Computer Data Management Application d. Common Division Multi User Application
6. In PNP transistor the P type crystal act as ...
   a. Emitter only b. Base only c. Collector only **d. Either emitter or collector**
7. TELNET is used for:
   a. File transfer b. Information Server **c. Remote login** d.Email
8. 9's complement of decimal digit 6 is:
   a. 1 b. 5 **c. 3** d.2
9. Which type of transformer is used before transmitting electricity for long distance:
   a. Step Up b. Step Down c. Current Transformer d. Potential Transformer
10. Transformer cores are laminated in order to:
    a. Simplify its construction **b. Minimize eddy current loss** c. Reduces cost
    d.Reduce hysteresis loss
11. The standard width of stripes in Zebra crossing is:
    a. 350mm to 600mm b. 300mm to 700mm **c. 400mm to 600mm** d. 400mm to 700mm
12. In terms of Computing, what does POP stands for:
    a. Point of Purchase **b. Post Office Protocol** c. Probability of Precipitation d. Point of Publish

13. Cement is:
a. Siliceous b. Calcareous c. Argillaceous d.None

14. At no load condition in a motor:
a. $V_1=E_1$ and $V_2>E_2$ b. $V_1<E_1$ and $V_2=E_2$ c. $V_1=E_1$ and $V_2=E_2$ d. None of above

MATHS-II(15 X 2 =30)

1. If $\log_7 2 = m$, then $\log_{49} 28 =$?
a. $2(1+2m)$ b. $\frac{1}{2}(1+2m)$ c. $\frac{1}{(1+2m)}$ d. $1+m$

2. Sum of roots of a quadratic equation is 1 and sum of their squares is 13, the equation is:
a. $x^2-x-6=0$ b. $x^2-12x-13=0$ c. $x^2-5x+6=0$ d. $x^2-7x+10=0$

3. General solution of $\tan\alpha.\tan 2\alpha = 1$ is:
a. $\pi/3 + n\pi$ b. $\pi/2\,(6n \pm 1)$ c. $\pi/6\,(4n \pm 1)$ d. $\pi/6\,(2n+1)$

4. In ΔABC If $a=2$, $b=\sqrt{6}$, $A=45°$, value of C is:
a. 45° b. 60° c. 75° d. 120°

5. The value of $(1/2 + i\sqrt{3}/2)^7$ is:
a. $1+i$ b. $2+i$ c. $(1/2 + i\sqrt{3}/2)$ d. $(1/\sqrt{2} + i\,3/\sqrt{2})$

6. If p times p^{th} term of an AP is equal to the q times q^{th} term of that AP, then $(p+q)^{th}$ term of the AP is:
a. q/p b. p+q c. pq d. 0

7. In how many ways the letters of the word 'MATHEMATICS' can be arranged in a row if vowels are never included?
a. 5040 b. 2520 c. 1260 d. 630

8. If $x = t + \frac{1}{t}$ and $y = t - \frac{1}{t}$, $\frac{dy}{dx}$=?
a. x+y b. xy c. $\frac{y}{x}$ d. $\frac{x}{y}$

9. $\int_0^{\pi/2} \frac{dx}{1+\sin x}$ = ?
a. 1 b. 2 c. 0 d. ∞

10. Unit vector perpendicular to both $i + j$ and $i + k$ is:
a. $i-j+k$ b. $(i-j+k)/\sqrt{3}$ c. $(i+j+k)/\sqrt{3}$ d. $(i+j-k)/\sqrt{3}$

11. If the lines represented by equation $ax^2+hxy-y^2=0$ makes angle α and β with x-axis, then $\tan(\alpha+\beta)$ is:
a. $\frac{h}{1+a}$ b. $\frac{-h}{1+a}$ c. $\frac{a}{1+b}$ d. $\frac{-a}{1+b}$

12. $\lim_{x\to\infty}\left(\frac{x+1}{x+2}\right)^{2x+1}$ =
a. 1 b. e^{-1} c. e^{-2} d. e

13. The area of the region bounded by the curves $y = x^2$ and $y = |x|$ is:
a. $1/2$ b. $1/3$ c. $1/4$ d. $7/4$

14. A curve is given by: $x = t^2$ and $y = 2t$. The equation of normal at t=1 is:
a. $x + y = 3$ b. $x + y = 1$ c. $x + y = -1$ d. $x + y = -8$

15. The co-efficient of x^{12} in the expansion of $(1+x^2)^{12}$ is:
a. 924 b. 815 c. 712 d. 196

PHYSICS-II(15 X 2=30)

1. The velocity of an object initially at rest is given by $v = t^2$ where t is the time elapsed. The distance travelled by object in first 3 seconds is:
a. 4m b. 9m c. 6m d. 18m

2. Three particles A, B and C are situated at the vertices of an equilateral triangle ABC of side L at t = 0. Each of the particle move with constant speed v. A always has its velocity along AB, B along BC and C along CA. At what time will these particles meet each other?
   a. $\frac{2L}{3V}$ b. $\frac{L}{V}$ c. $\frac{3L}{4V}$ d. Never
3. A pendulum of mass 'm' suspended from a point on ceiling with a wire of length l. The breaking strength of the wire is 10^5N. What is the maximum angular displacement that can be given to the pendulum?
   a. 90^0 b. 45^0 c. 60^0 d. 30^0
4. A rifle bullet loses (1/20th) of its velocity in passing through a plank. The least number of such planks required to just stop the bullet is
   a. 5 b. 10 c. 20 d. 11
5. A body 'A' with velocity 'v' collides with another body 'B' of identical mass at rest. The velocities of bodies 'A' and 'B' after collision is:
   a. v/2 , v/2 b. 0,v c. v,0 d. $v/\sqrt{2}$, $v/\sqrt{2}$
6. Two hail stones with radii in the ratio of 1:2 fall from a great height through the atmosphere. Then the ratio of their momenta after they have attained terminal velocity is
   a. 1:32 b. 1:1 c. 1:4 d. 1:16
7. A metallic sphere with an internal cavity has 40g weight in air and 20g weight in water. If the density of metal is 8 g/cc, the volume of the cavity is
   a. 5 cc b. 15cc c. 0 cc d. 20 cc
8. A body takes 10 minutes to cool from 60^0C to 50^0C. If the temperature of the surrounding is 25^0C, then the temperature of the body after next 10 minutes will be
   a. 42.85^0C b. 46.73^0C c. 49.26^0C d. 47.85^0C
9. When 1 mole of monoatomic gas is mixed with 3 moles of a diatomic gas, the value of adiabatic expansion γ of the mixture is
   a. 5/3 b. 3/2 c. 4/3 d. 13/9
10. The intensity level of two waves of same frequency in a given medium are 20 dB and 60 dB. The ratio of their amplitudes is
    a. 1:4 b. 1:100 c. $1:10^4$ d. 1:16
11. A $3\mu F$ and $6\mu F$ capacitor are connected in series across 300V battery. The charge on each capacitor is:
    a. $9x10^{-4}$C b. $6x10^{-4}$C c. $27x10^{-4}$C d. $18\ x10^{-4}$C
12. If a charged particle is describing a circle of a radius r in a magnetic field with a time period T, then
    a. $T^2 \alpha r^3$ b. $T \alpha r^0$ c. $T \alpha r^2$ d. $T^2 \alpha r$
13. The RMS value of i= $I_1 \sin\omega t + I_2 \cos\omega t$ is
    a. $(I_1+I_2)/2$ b. $\sqrt{\frac{I_1^2+I_2^2}{2}}$ c. $\frac{\sqrt{I_1^2+I_2^2}}{2}$ d. $(I_1-I_2)/2$
14. The dispersive power of the material of the two lenses forming an achromatic combination is 4:3. If the focal length of the combination is +60 cm, the focal lengths of components lenses must be
    a. -20cm, 25cm b. 20cm, -25cm c. -20cm, 15cm d. -15cm, 20cm
15. An X-ray is operated at 20KV. The maximum speed of the electron striking the anticathode will be: (mass of electron = $9.1*10^{-31}$kg)
    a. 4.2x107 ms^{-1} b. $8.4x10^3$ ms^{-1} c. $8.4x10^7$ ms^{-1} d. $4.8x10^7$ ms^{-1}

CHEMISTRY II(4X2=8)

1. 1.2 gm of sample of washing soda was dissolved in water and volume was made upto 250cc. 25 cc of diluted solution when titrated against 0.1N HCl required 17cc. Percentage of anhydrous sodium carbonate in given sample is
   a. 70 b. 72 c. 73 d. 75
2. An oxide of an element contains 68.96% of oxygen. The specific heat of the element is 0.59 cal/gm. 100 cc of the vapours of element fluoride at STP weighs 0.605 gm.
   The formula of the element fluoride is

a. EF_2 b. EF_3 c. E_2F_4 **d. E_2F_6**

3. **When a gas obtained by roasting iron pyrite is passed through acidic solution of hydride of Sulphur then**
   a. H_2SO_4 is formed b. H_2SO_3 is formed **c. S is precipitated** d. None of the above
4. **Electrolysis of sodium salt of ethanoic acid, succinic acid, maleic acid produces respectively**
   a. Ethyne, ethane & ethane b. Ethane, ethyne & ethane
   c. Ethane, ethene & ethyne d. Ethane, ethane & ethyne

ENGLISH-II (4X2=8)

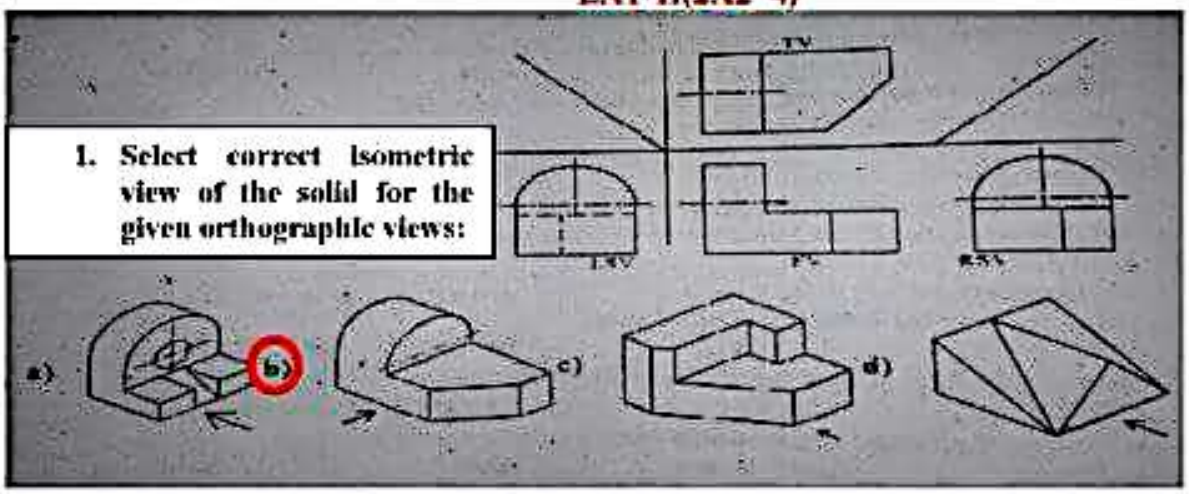
Read the passage carefully and tick the correct answer:

Never a very confident man Hanley was happy to leave all the arrangements of the exhibition to his agent, a young man by the name of Green, who has a talent for organization. Green had been to his studio and, with the help of Hanley's wife, has selected pictures, most important of all, he had seen to it that all invitations went to the right people: critics, reporters and of course people with money to spend on paintings.

"There's no doubt about it", Green assured him during exhibition, "everything has gone off very well." Henley was pleased, but remained shyly in the background, declining to meet his public.

1. **Organization was something that Green:**
   a. believed in b. enjoyed c. practiced **d. did well**
2. **The exhibition was:**
   a. taken away b. successful c. rapid **d. unusual**
3. **During the exhibition Hanley:**
   a. met everyone b. stayed at home **c. met no one** d. refused invitations
4. **Hanley:**
   a. forgot to arrange exhibition. b. allowed his agent to arrange the exhibition
   c. was happy about exhibition **d. helped his agent to arrange the exhibition**

EAT-II(2X2=4)



2. **Which of the following orthographic views have missing lines?**
   a. Front View and top View c. Top View and Side View
   b. Front View and Side View **d. Front View Only**