

Previous Years'  
**SOLVED PAPERS**  
& 5 Mock Tests

# BCECE

BIHAR COMBINED ENTRANCE COMPETITIVE EXAM

# MEDICAL

Authentic & Complete Solutions to Previous Years' BCECE (2001-2015)  
MEDICAL Questions & 5 Mock Tests



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# BCECE

BIHAR COMBINED ENTRANCE COMPETITIVE EXAM

About the Exam & How To **Succeed** in It ?

## The BCECE Medical Entrance Exam

The Bihar Combined Entrance Competitive Examination (BCECE) is the entrance test conducted by BCECE Board, on behalf of the Government of Bihar for admission into various professional courses offered by Institutions/ Colleges/University of the State of Bihar. The exam is open for the students of Bihar domicile only.

The BCECE Board has been constituted by the Government of Bihar in accordance with the Bihar Combined Entrance Competitive Examination Act, 1995. The primary purpose of the Board for conducting BCECE is to select suitable and meritorious students of Bihar for admission in to Medical, Engineering, and Agricultural streams available not only in different Colleges within Bihar, but also for the Institutions situated outside Bihar against 'State Quota' seats. The Board also conducts Post Graduate Medical Admission Test (PGMAT) for admission in Post Graduate Medical Course in Medical Colleges of the State of Bihar.

BCECE is an examination held in two stages. The first stage is the screening test. The successful / shortlisted candidates are then need to appear in Stage-II of the exam, which is of three papers, held on the subjects of Physics, Chemistry and Biology, for medicine aspirants. The level of the test is that of intermediate (10+2) and the medium is English.

Advertisement for BCECE appears in all leading State Newspapers, usually during the month of December/ January, and the first stage of exam generally held in April, followed by Stage-II in May/ early June. The result is usually declared in July , and the classes start in August.

On the basis of the merit obtained in the test, merit list is prepared categorywise. As per the trend, the lists of successful candidates are published in leading newspapers of the State, as well as in participating Colleges.

### Medical Colleges Under BCECE

At present, there are 11 medical colleges in Bihar taking together both government and private, in which admission is administered through BCECE. Selection is strictly based on the merit obtained by candidates in the entrance exam. The admission is given through a process of counseling by the Board. Names of the medical colleges and their intake are given below:

All the institutes offer great laboratories as well as excellent medical based education and quality infrastructure. These colleges have hostel facilities both for boys and girls as well. As the seats are very less, competition is very tough and students have to prepare well for getting admission in their desired colleges. MBBS course is of 5 & ½ years of duration, with one year of compulsory rotating internship.

S.No.	Name	Address	Management	Intake
1.	A N Magadh Medical College	Sheraghati Road, Gaya - 823001 Bihar, India Phone: 0631-2410339, Fax: 0631-2410339	Govt.	100
2.	Darbhanga Medical College	Leheri Sarai, Darbhanga - 846003 Bihar, India Phone: 06272-2333228/2333081 Fax: 06272-2333228	Govt.	100
3.	Jawaharlal Nehru Medical College	Bhagalpur - 812001, Bihar, India Phone: 0641-2401078, Fax: 0641-2400044	Govt.	100
4.	Katihar Medical College	Karim Bagh, P.O. Box No. 23 Katihar - 854105 Bihar, India Phone: 06452-222714/226692, Extn : 202, Fax: 06452-225219	Pvt.	60
5.	Mata Gujri Memorial Medical College	Kishanganj - 855107 Bihar, India Phone: 06456-222719, Fax: 06456-222414	Pvt.	60
6.	Nalanda Medical College	Kankarbagh, Patna - 800020, Bihar, India Phone: 0612-2354871/2354828 Fax: 0612-2354871 E-Mail: nmcpat@yahoo.com nmcpat@sancharnet.in	Govt.	100
7.	Patna Medical College	Patna - 800004 Bihar, India Phone: 0612-673343	Govt.	150
8.	Shri Krishna Medical College	P.O. Umanagar, Muzaffarpur - 842004 Bihar, India Phone: 0621-2230271, Fax: 0621-2230271	Govt.	100
9.	Govt Medical College	Madhepura, Bihar	Govt.	100
10.	Vardhaman Ayurvedigyan Institute	Pawapuri, Nalanda, Bihar	Govt.	100
11.	Govt Medical College	Bettiah, West Champaran, Bihar	Govt.	100

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### RESERVATION OF SEATS

- 10% of the total seats in the Medical Colleges are reserved for the students belonging to the Scheduled Castes (SC).
- 10% of the seats are reserved for the students of Scheduled Tribes (ST).
- 10% for Backward Classes (BC).
- 2% seats are for the children of Armed personnel.

### Career After Medicine (...From Medical Colleges in Bihar)

Medical education in Bihar has an illustrious past, glorious present and bright and promising future. The State has produced many eminent doctors who are not only of national, but also of international repute. Over and above, in recent years, the State has achieved an incredible growth rate with a direct consequence on the improvement of the overall education, including professional courses in the State; and this has brought an enhancement in medical studies within the state as well.

As a career, Medicine is one of the most sought after, and rewarding for those interested in science, and dealing with sick people. A doctor's profession involves a lot of hard work, but provides the noble satisfaction of curing patients, at times even saving lives. For practicing as a physician or surgeon, one needs to have completed the MBBS course from a recognised medical college and must possess a license from the State Medical Council to practice.

As a profession, Medicine offers maximum opportunity for growth. Over the years, the field of medical studies has undergone enormous stages of development, and it has become so vast that specialisations within it have been growing day by day.

There are various areas of specialisation available for the doctors. After doing MBBS, candidates can go for post graduate level studies (MD or MS). Post Graduate programmes (MD or MS) is usually of 3 years duration. There are also Super Specialisations which require a further 3 to years of study.

Those with Post Graduation (MD or MS or M. Sc in Medicine) can go for Ph. D in any specialised area of medicine. MD or MS holders can complete the Doctoral Programme (Ph D) in 2 years and M. Sc Medicine holders in 3 years.

*The employment opportunities a doctor finds can broadly be categorised as below:*

- In government or private hospitals
- In nursing homes/clinics/health departments
- In medical services of the army, the navy and the air force, under the Ministry of Defence
- In charitable institutions
- In medical colleges and training institutes as teachers
- In research institutes and medical colleges as researchers
- In the industrial sector
- Private practice/ self-employment

# Solved Paper 2015

## BCECE

Medical Entrance Exam

### Physics

A ball is thrown from the ground to clear a wall 3 m high at a distance of 6 m and falls 18 m away from the wall, the angle of projection of ball is

- (a)  $\tan^{-1}\left(\frac{3}{2}\right)$
- (b)  $\tan^{-1}\left(\frac{2}{3}\right)$
- (c)  $\tan^{-1}\left(\frac{1}{2}\right)$
- (d)  $\tan^{-1}\left(\frac{3}{4}\right)$

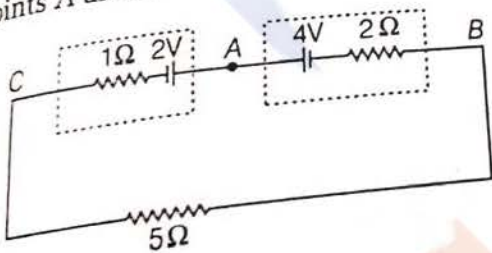
Consider if the electric flux entering and leaving an enclosed surface respectively are  $\phi_1$  and  $\phi_2$ , the electric charge inside the surface will be

- (a)  $\epsilon_0(\phi_1 + \phi_2)$
- (b)  $\frac{\phi_2 - \phi_1}{\epsilon_0}$
- (c)  $\frac{\phi_1 - \phi_2}{\epsilon_0}$
- (d)  $\frac{\phi_1 + \phi_2}{\epsilon_0}$

If the escape speed of a projectile on Earth's surface is  $11.2 \text{ kms}^{-1}$  and a body is projected out with thrice this speed, then determine the speed of the body far away from the Earth.

- (a)  $56.63 \text{ kms}^{-1}$
- (b)  $33 \text{ kms}^{-1}$
- (c)  $39 \text{ kms}^{-1}$
- (d)  $31.7 \text{ kms}^{-1}$

Determine the potential drop between the points A and C in the following circuit.



Resistances  $1\Omega$  and  $2\Omega$  are representing the internal resistances of the respective cells.

- (a)  $\frac{4}{5} \text{ V}$
- (b)  $1.75 \text{ V}$
- (c)  $2.25 \text{ V}$
- (d)  $\frac{5}{4} \text{ V}$

5. A tank is filled with a liquid upto a height H. A small hole is made at the bottom of this tank. Consider  $t_1$  be the time taken to empty first half of the tank and  $t_2$  be the time taken to empty rest half of the tank. Then, determine the ratio  $\frac{t_1}{t_2}$ .

- (a) 1.33
- (b) 1.5
- (c) 2
- (d) 0.414

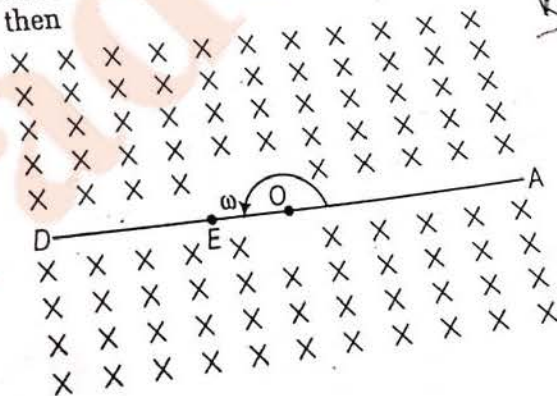
6. An electron and a proton enter a magnetic field perpendicularly both have same kinetic energy. Which of the following statements are true?

- (a) Trajectory of proton is less curved
- (b) Trajectory of electron is less curved
- (c) Both trajectories are equally curved
- (d) Both move on straight line path

7. The coefficient of volume expansion of glycerine is  $49 \times 10^{-5} \text{ K}^{-1}$ . What is the fractional change in its density for a  $30^\circ \text{C}$  rise in temperature?

- (a)  $1.5 \times 10^{-2}$
- (b)  $2 \times 10^{-4}$
- (c)  $3.5 \times 10^{-3}$
- (d)  $2.5 \times 10^{-2}$

8. If a conducting rod of length  $4l$  is rotated about at point O in a uniform magnetic field B directed into the paper and  $DE = l$ ,  $EA = 3l$ , then



Handwritten notes:  $R_1, R_2$  and  $\frac{1}{R_1} + \frac{1}{R_2}$

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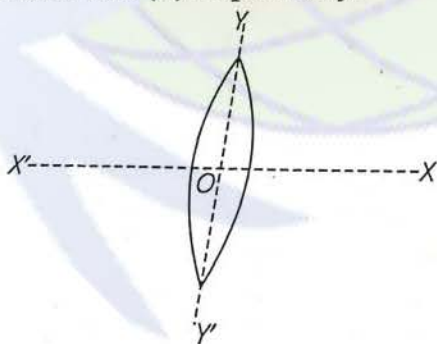
- (a)  $v_A - v_E = \frac{9}{2} Bca^2$  (b)  $v_F - v_A = \frac{9}{2} Bca^2$   
 (c)  $v_D - v_E = \frac{Bca^2}{2}$  (d)  $v_A - v_E = 4Bca^2$

9. An open organ pipe has a fundamental frequency of 300 Hz. The first overtone of a closed organ pipe has the same frequency as the first overtone of organ pipe. How long is each pipe?  
 (a) 41.25 cm (b) 42.3 cm  
 (c) 49.5 cm (d) 40.5 cm

10. In L-C-R circuit,  $f = \frac{50}{\pi}$  Hz,  $V = 50$  V,  $R = 300 \Omega$ . If  $L = 1$  H and  $C = 20 \mu\text{C}$ , then the voltage across capacitor is  
 (a) 50 V (b) 20 V  
 (c) zero (d) 30 V

11. In a car race, car A takes a time  $t$  less than car B at the finish and passes the finishing point with speed  $v$  more than that of the car B. Assuming that both the cars starts from rest and travel with constant accelerations  $a_1$  and  $a_2$  respectively. So, the value of  $v$  will be  
 (a)  $(\sqrt{a_1/a_2})t$  (b)  $(\sqrt{a_2/a_1})t$   
 (c)  $(a_1\sqrt{a^2})t$  (d)  $(\sqrt{a_1a_2})t$

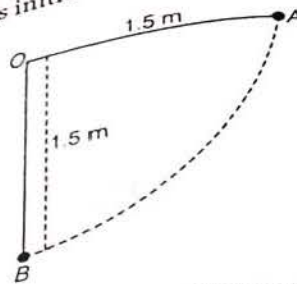
12. If an equiconvex lens is cut into two halves along (i)  $XOX'$  and (ii)  $YOY'$  as shown in the figure. Let  $f, f', f''$  be the focal lengths of complete lens of each, in case (i) and of each half in case (ii) respectively.



Choose the correct statement from the following?

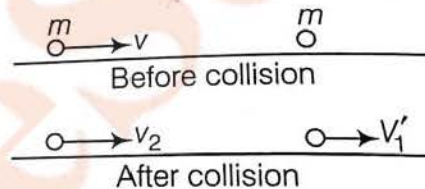
- (a)  $f' = f, f'' = f$   
 (b)  $f' = 2f, f'' = 2f$   
 (c)  $f' = f, f'' = 2f$   
 (d)  $f' = 2f, f'' = f$

13. The bob of a pendulum is released from a horizontal position A as shown in the figure. If the length of the pendulum is 1.5 m, what is the speed with which the bob arrives at the lower most point B, given that it dissipated 5% of its initial energy against air resistance?



- (a) 5 m/s (b) 5.5 m/s  
 (c) 5.3 m/s (d) 4.4 m/s
14. In a photoemissive cell with exciting wavelength  $\lambda$ , the fastest electron has speed  $v$ . If the exciting wavelength is changed to  $\frac{3\lambda}{4}$ , the speed of fastest emitted electron will be  
 (a) greater than  $v \left(\frac{4}{3}\right)^{1/2}$  (b)  $v \left(\frac{3}{4}\right)^{1/2}$   
 (c)  $v \left(\frac{4}{3}\right)^{1/2}$  (d) less than  $v \left(\frac{4}{3}\right)^{1/2}$

15. A ball of mass  $m$  moving at a speed  $v$  makes a head on collision with an identical ball at rest. The kinetic energy at the balls after the collision is  $3/4$ th of the original. What is the coefficient of restitution?



- (a)  $1/\sqrt{3}$  (b)  $1/\sqrt{2}$   
 (c)  $\sqrt{2}$  (d)  $\sqrt{3}$

16. A radioactive material decays by simultaneous emission of two particles with half-lives 1620 yr and 810 yr respectively. The time in years after which one-fourth material remains, is

- (a) 1080 yr (b) 2340 yr  
 (c) 4860 yr (d) 3240 yr

BCECE (Medical) Solved Paper 2015 3

A cylinder rolls up an inclined plane at an angle of  $30^\circ$ . At the bottom of the inclined plane, the centre of mass of the cylinder has a velocity of  $5 \text{ m/s}$ . How long will it take to return to the bottom?

- (b) 3 s
- (d) 4 s

The current gain in the common emitter amplifier mode of a transistor is 10. The input resistance is  $20 \text{ k}\Omega$  and load of resistance is  $1 \text{ k}\Omega$ . The power gain is

- (b) 500
- (d) 100

What will be the displacement equation of a simple harmonic motion obtained by combining the motions?

$$x_2 = 4 \sin\left(\omega t + \frac{\pi}{6}\right) \text{ and}$$

$$x_1 = 2 \sin \omega t,$$

$$x_2 = 6 \sin\left(\omega t + \frac{\pi}{3}\right)$$

- (a)  $x = 10.25 \sin(\omega t + \phi)$
- (b)  $x = 10.25 \sin(\omega t - \phi)$
- (c)  $x = 11.25 \sin(\omega t + \phi)$
- (d)  $x = 11.25 \sin(\omega t - \phi)$

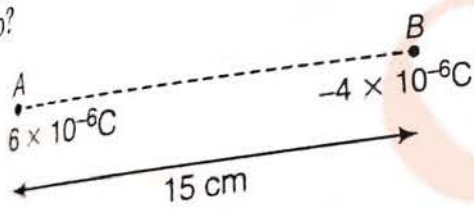
An ammeter A reads 2 A and the voltmeter V reads 20 V. The value of resistance R is assuming finite resistances of ammeter and voltmeter)

- (b) less than  $10 \Omega$
- (d) we cannot definitely say

A stream of water flowing horizontally with the speed of  $15 \text{ ms}^{-1}$  gushes out of a tube of cross-sectional area  $10^{-2} \text{ m}^2$  and hits a vertical wall nearby. What is the force exerted on the wall by the impact of water? Assuming it does not rebound.

- (b) 2000 N
- (d) 1000 N

Two charges  $+6 \mu\text{C}$  and  $-4 \mu\text{C}$  are placed 15 cm apart as shown. At what distances from A to its right, the electrostatic potential is zero?



- (b) 9, 15, 45
- (d) 9, 45, infinity

23. A shell of mass  $0.020 \text{ kg}$  is fired by a gun of mass  $100 \text{ kg}$ . If the muzzle speed of the shell is  $80 \text{ ms}^{-1}$ . What is the recoil speed of the gun?

- (a)  $1.6 \text{ cms}^{-1}$
- (b)  $0.5 \text{ cms}^{-1}$
- (c)  $2 \text{ cms}^{-1}$
- (d)  $3 \text{ cms}^{-1}$

24. If  $E = 100 \sin(100t)$  volt and  $I = 100 \sin\left(100t + \frac{\pi}{3}\right)$  mA are the instantaneous voltage and current, then the rms values of voltage and current are respectively;

- (a)  $70.7 \text{ V}, 70.7 \text{ mA}$
- (b)  $60.9 \text{ V}, 69.3 \text{ mA}$
- (c)  $90.6 \text{ V}, 141.4 \text{ mA}$
- (d)  $60 \text{ V}, 70 \text{ mA}$

25. If torques of equal magnitudes are applied to a hollow cylinder and a solid sphere both having the same mass and radius. The cylinder is free to rotate about its standard axis of symmetry and the sphere is free to rotate about an axis passing through its centre. Which of the two will acquire a greater angular speed after a given time?

- (a)  $\omega_1 > \omega_2$
- (b)  $\omega_1 = \omega_2$
- (c)  $\omega_2 > \omega_1$
- (d) None of these

26. The threshold frequency for certain metal is  $3.3 \times 10^{14} \text{ Hz}$ . If light of  $8.2 \times 10^{14} \text{ Hz}$  frequency is incident on the metal, then the cut-off voltage of the photoelectric current will be

- (a) 3 V
- (b) 4 V
- (c) 2 V
- (d) 2.5 V

27. If two simple pendulums first of bob mass  $M_1$  and length  $l_1$ , second of bob mass  $M_2$  and length  $l_2$ . Given  $M_1 = M_2$  and  $l_1 = 2l_2$ . If the vibrational energies of both are same, then which of the following is correct?

- (a) Amplitude of B is smaller than A
- (b) Amplitude of B is greater than B
- (c) Amplitude will be same
- (d) None of the above

28. A thin film of soap solution ( $\mu_s = 1.4$ ) lies on the top of a glass plate ( $\mu_g = 1.5$ ). When visible light is incident almost normal to the plate, two adjacent reflection maxima are observed at two wavelengths  $420 \text{ nm}$  and  $630 \text{ nm}$ . The minimum thickness of the soap solution are

- (a)  $420 \text{ nm}$
- (b)  $500 \text{ nm}$
- (c)  $450 \text{ nm}$
- (d)  $490 \text{ nm}$

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29. An air bubble starts rising from the bottom of a lake. Its diameter is 3.6 mm at the bottom and 4 mm at the surface. The depth of the lake is 250 cm and the temperature at surface is 40°C.

What is the temperature at the bottom of the lake? Given atmospheric pressure = 76 cm of Hg and  $g = 980 \text{ cm/s}^2$ .

- (a) 11°C (b) 12.36°C (c) 13°C (d) 10.37°C

30. If four atoms of hydrogen combine to form an  ${}^4_2\text{He}$  atom, then the amount of energy released is

- (a) 26.7 MeV (b) 25.3 MeV  
(c) 22 MeV (d) 24.5 MeV

31. A simple harmonic wave of amplitude 8 unit travels along positive x-axis. At any given instant of time, for a particle at a distance of 10 cm from the origin, the displacement is +6 unit and for a particle at a distance of 25 cm from the origin, the displacement is +4 unit. Calculate the wavelength.

- (a) 200 cm (b) 230 cm (c) 210 cm (d) 250 cm

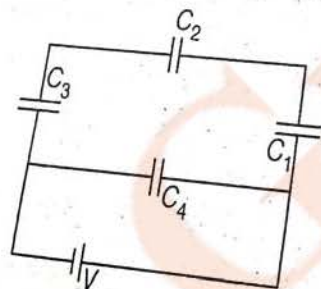
32. When a battery of emf 8 V with internal resistance  $0.5 \Omega$  is charged by a 120 V DC supply using a series resistance of  $15.5 \Omega$ , then the terminal voltage of the battery is

- (a) 11.5 V (b) 20 V (c) 21.5 V (d) 12.3 V

33. A rigid bar of mass 15 kg is supported symmetrically by three wires each 2 m long. Those at each end are of copper and the middle one is of iron. Determine the ratio of their diameters if each is to have the tension.

- (a) 12.6 : 2 (b) 1.31 : 1  
(c) 4.65 : 3 (d) 2.69 : 4

34. Figure given below shows a network of four capacitors of capacitance equal to  $C_1 = C$ ,  $C_2 = 2C$ ,  $C_3 = 3C$ ,  $C_4 = 4C$  are connected to a battery. The ratio of charges on  $C_2$  and  $C_4$  is



- (a) 7/4 (b) 7/22 (c) 3/22 (d) 4/7

35. Two trains A and B of length 400 m each are moving on two parallel tracks with a uniform speed of  $72 \text{ kmh}^{-1}$  in the same direction, with A ahead of B. The driver of B decides to overtake A and accelerates by  $1 \text{ m/s}^2$ . If after 50 s, the guard of B just brushes past the driver of A, what was the original distance between them?

- (a) 100 m (b) 1150 m (c) 1300 m (d) 1250 m

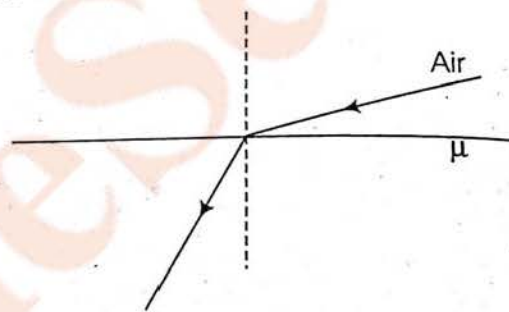
36. If a fully charged capacitor C with initial charge  $q_0$  is connected to a coil of self inductance L at  $t = 0$ . The time at which the energy is stored equally between the electric field and magnetic field is

- (a)  $\pi\sqrt{LC}$  (b)  $\frac{\pi}{4}\sqrt{LC}$  (c)  $\frac{\pi}{2}\sqrt{LC}$  (d)  $\frac{\pi}{6}\sqrt{LC}$

37. A rocket is fired from the Earth towards the Sun. At what distance from the Earth's centre, the gravitational force on the rocket is zero? Mass of the Sun =  $2 \times 10^{30} \text{ kg}$  and mass of the Earth =  $6 \times 10^{24} \text{ kg}$ .

- (a)  $2.6 \times 10^8 \text{ m}$  (b)  $3.2 \times 10^8 \text{ m}$   
(c)  $3.9 \times 10^9 \text{ m}$  (d)  $2.3 \times 10^9 \text{ m}$

38. In the figure given below, for an angle of incidence  $45^\circ$  at the top surface, what is the minimum refractive index need to total internal reflection at vertical face?



- (a)  $\frac{\sqrt{2} + 1}{2}$  (b)  $\sqrt{\frac{1}{2}}$   
(c)  $\sqrt{\frac{3}{2}}$  (d)  $\sqrt{2} + 1$

39. A solid cylinder of mass 20 kg rotates about its axis with angular speed  $100 \text{ rad s}^{-1}$ . The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder? What is the magnitude of angular momentum of cylinder about its axis?

- (a) 62.5 T-s (b) 70.4 T-s (c) 79.6 T-s (d) 60.5 T-s

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change of 8.0 mA in the emitter current  
 a change of 7.9 mA in the collector  
 current. The values of  $\alpha$  and  $\beta$  are  
 (a) 0.99, 90 (b) 0.96, 79 (c) 0.97, 99 (d) 0.99, 79

stone of mass 0.25 kg tied to the end of a  
 string is whirled round in a circle of radius  
 1 m with speed 40 rev/min in a horizontal  
 plane. What is the tension in the string and  
 the maximum speed with which the string can  
 be whirled around, if the string can  
 withstand a maximum tension of 200 N?  
 (a) 6 N, 37 ms<sup>-1</sup> (b) 6 N, 35 ms<sup>-1</sup>  
 (c) 7.5 N, 46 ms<sup>-1</sup> (d) 8 N, 38 ms<sup>-1</sup>

A straight wire of mass 200 g and length 1.5 m  
 carries a current of 2 A. It is suspended in mid  
 air by a uniform horizontal magnetic field  $B$ .  
 The magnitude of  $B$  (in tesla) is  
 (a) 0.65 (b) 0.55 (c) 0.75 (d) 0.45

A U-shaped wire is dipped in a soap solution  
 and removed. The thin soap film formed  
 between the wire and light slider supports a  
 weight of  $1.5 \times 10^2$  N. The length of the slider is  
 30 cm. What is the surface tension of the film?  
 (a)  $3 \times 10^{-3}$  Nm<sup>-1</sup> (b)  $2 \times 10^{-5}$  Nm<sup>-1</sup>  
 (c)  $4 \times 10^{-4}$  Nm<sup>-1</sup> (d)  $2.5 \times 10^{-2}$  Nm<sup>-1</sup>

At constant pressure, the ratio of increase in  
 volume of an ideal gas per degree rise in  
 kelvin temperature to its original volume is  
 (a)  $T^2$  (b)  $\frac{1}{T}$  (c)  $T^3$  (d)  $T$

The length of a magnet is large compared to  
 its width and breadth. The time period of its  
 oscillation in vibration magnetometer is 2 s.  
 The magnet is cut along its length into three  
 equal parts and three parts are then palced on

each other with their like poles together. The  
 time period of this combination will be  
 (a)  $\frac{2}{3}$  s (b)  $\sqrt{\frac{2}{3}}$  s (c)  $\frac{3}{2}$  s (d)  $\sqrt{\frac{3}{2}}$  s

46. A body of mass 1 kg is moving in a vertical  
 circular path of radius 1 m. The difference  
 between the kinetic energies at its highest  
 and lowest positions is  
 (a)  $4\sqrt{5}$  J (b) 20 J (c) 10 J (d) 30 J

47. If electrical force between two charges is  
 200 N and we increase 10% charge on one of  
 the charges and decrease 10% charge on the  
 other, then electrical force between them for  
 the same distance becomes  
 (a) 200 N (b) 202 N (c) 198 N (d) 199 N

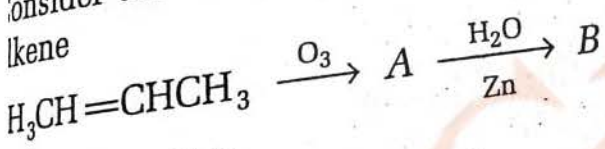
48. The acceleration due to gravity on the planet  
 is 9 times the acceleration due to gravity on  
 planet B. A man jumps to a height of 2 m on  
 the surface of A. What is the height of jump  
 by the same on the planet B?  
 (a) 6 m (b)  $\frac{2}{3}$  m (c)  $\frac{2}{9}$  m (d) 18 m

49. In hydrogen atom spectrum, frequency of  
 $2.7 \times 10^{15}$  Hz of EM wave is emitted when  
 transmission takes place from 2 to 1. If it  
 moves from 3 to 1, the frequency emitted  
 will be  
 (a)  $3.2 \times 10^{15}$  Hz (b)  $32 \times 10^{15}$  Hz  
 (c)  $1.6 \times 10^{15}$  Hz (d)  $16 \times 10^{15}$  Hz

50. If a ray of light in a denser medium strikes a  
 rarer medium at an angle of incidence  $i$ , the  
 angles of reflection and refraction are  
 respectively  $r$  and  $r'$ . If the reflected and  
 refracted rays are at right angles to each other,  
 the critical angle for the given pair of media is  
 (a)  $\sin^{-1}(\tan r')$  (b)  $\sin^{-1}(\tan r)$   
 (c)  $\tan^{-1}(\sin i)$  (d)  $\cot^{-1}(\tan i)$

Chemistry

Consider the following reaction sequence of  
 alkene



The product B is

- (a)  $CH_3CH_2COCH_3$
- (b)  $CH_3COCH_3$
- (c)  $CH_3CHO$
- (d)  $CH_3CH_2CHO$

52. Choose the correct statement about the  
 industrial preparation of hydrogen from  
 water gas (CO + H<sub>2</sub>).

- (a) H<sub>2</sub> is removed through occlusion with Pd
- (b) CO and H<sub>2</sub> are fractionally separated using  
 differences in their densities
- (c) CO is removed by absorption in aq. Cu<sub>2</sub>Cl<sub>2</sub>  
 solution
- (d) CO is oxidised to CO<sub>2</sub> with steam in the presence  
 of a catalyst followed by absorption of CO<sub>2</sub> in  
 alkali

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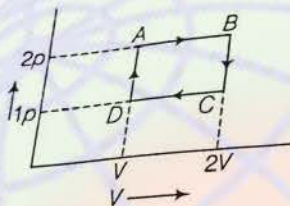
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53. The energy required to excite the electron in the atom from  $n=1$  to  $n=2$ , when the ionisation enthalpy of hydrogen atom is  $1.312 \times 10^6 \text{ J/mol}$  will be (in the unit of  $10^5$ ).

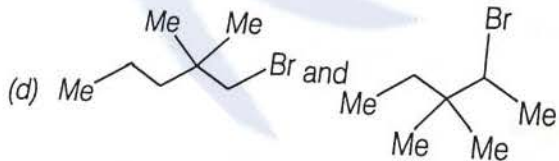
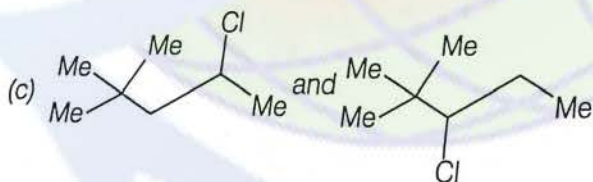
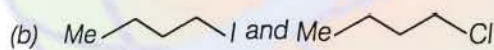
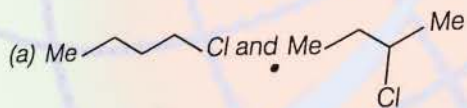
- (a) 8.53 (b) 7.51  
(c) 8.92 (d) 9.86

54. An ideal mono-atomic gas follows the path ABCD. Then, the work done during the complete cycle is



- (a) zero (b)  $-\frac{1}{2} pV$   
(c)  $-pV$  (d)  $-2 pV$

55. From the following which pairs give the faster  $S_N2$  reaction?



56. The reactivity order of halogenation of alkanes is  $F_2 > Cl_2 > Br_2 > I_2$ . Choose the correct statements.

- I. Lower the activation energy for the chain initiation step, more reactive is the halogen.  
II. Lower the activation energy for the first chain-propagation step, more reactive is the halogen.

III. Lower the activation energy for the second chain propagation step, more reactive is the halogen.  
IV. More negative is the overall heat of the reaction ( $\Delta H_r^\circ$  of halogenation of alkane) more reactive is the halogen.

- (a) I and II  
(b) I, II and III  
(c) II and IV  
(d) II, III and IV

57. What is the bond angle between Cl—O—Cl in  $Cl_2O_7$ ? (a)  $109^\circ$  (b)  $119^\circ$  (c)  $108^\circ 25'$  (d)  $120^\circ$

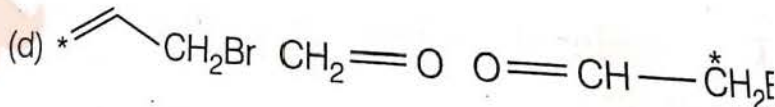
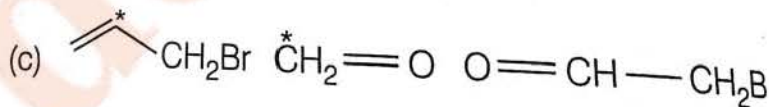
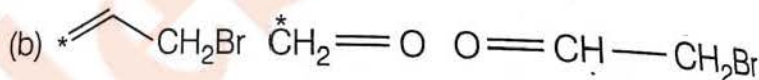
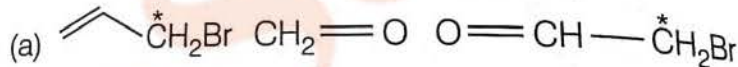
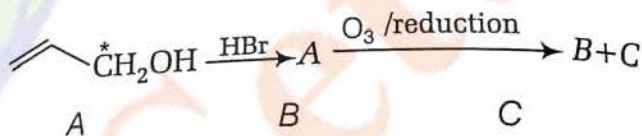
58. The solubility of fluorides of alkali metals in water is

- (a)  $LiF > NaF > RbF > CsF$   
(b)  $CsF > RbF > KF > NaF > LiF$   
(c)  $LiF > KF > NaF > CsF > RbF$   
(d)  $CsF > KF > NaF > RbF > LiF$

59. Which of the following relation is correct for gaseous and reversible reactions?

- (a)  $\frac{K_C}{K_P} = (RT)^{\Delta n_g}$  (b)  $\frac{K_P}{K_X} = (p)^{\Delta n_g}$   
(c)  $\frac{K_C}{K_X} = (p)^{-\Delta n_g}$  (d)  $\frac{K_C}{K_X} = \left(\frac{p}{RT}\right)^{\Delta n_g}$

60. Consider the following sequence of reactions,



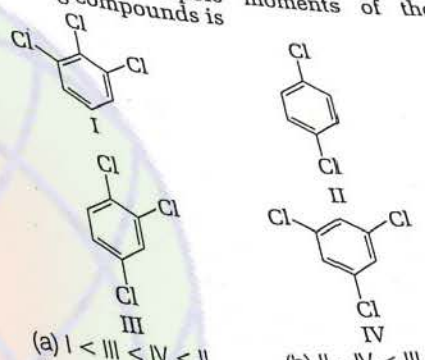
61. If the dipole moment of HBr is  $2.60 \times 10^{-30} \text{ Cm}$  and the interatomic space is  $1.41 \text{ \AA}$ , then the per cent ionic character HBr is

- (a) 16.23% (b) 13.21%  
(c) 11.50% (d) 15.81%

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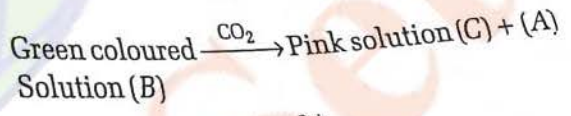
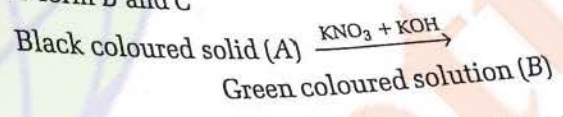
65. Beryllium gives a compound X with the following percentage composition : Be-6.1%, N-37.8%, Cl-48%. Molecular weight of X is  $148 \text{ g mol}^{-1}$  and that of Be is  $9 \text{ g mol}^{-1}$ . The molecular formula of the compound is  
 (a)  $\text{BeN}_4\text{Cl}_2\text{H}_{12}$   
 (b)  $\text{BeN}_2\text{ClH}_6$   
 (c)  $\text{BeN}_4\text{Cl}_2\text{H}_6$   
 (d)  $\text{BeN}_4\text{ClH}_8$

66. The increasing dipole moments of the following compounds is



- (a)  $I < III < IV < II$   
 (b)  $II = IV < III < I$   
 (c)  $II = I < IV < III$   
 (d)  $III < I < II < IV$

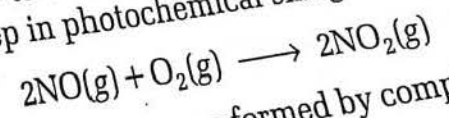
67. Compound A undergoes following reactions to form B and C



(C) decolourised by  $\text{Fe}^{3+}$   
 Identify A, B and C respectively

- (a)  $\text{MnO}_2$ ,  $\text{KMnO}_4$  and  $\text{K}_2\text{MnO}_4$   
 (b)  $\text{MnO}_2$ ,  $\text{K}_2\text{MnO}_4$  and  $\text{KMnO}_4$   
 (c)  $\text{KMnO}_4$ ,  $\text{MnO}_2$  and  $\text{K}_2\text{MnO}_4$   
 (d)  $\text{KMnO}_4$ ,  $\text{K}_2\text{MnO}_4$  and  $\text{MnO}_2$

68. The reaction between nitric oxide (NO) and oxygen to form nitrogen dioxide ( $\text{NO}_2$ ) is a key step in photochemical smog formation



The grams of  $\text{NO}_2$  are formed by complete by reaction of 1.20 g of NO is

- (a) 7.2 g (b) 2.3 g (c) 1.8 g (d) 4.1 g

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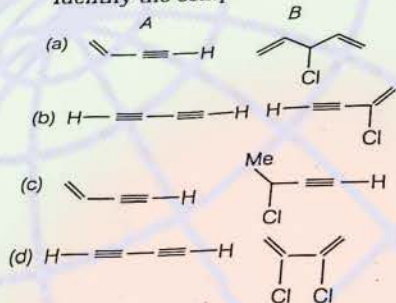
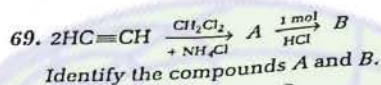
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Match the following Column I with Column II.

Column I	Column II
A. Acetic acid and methyl formate	1. Ring chain tautomerism
B. Maleic and fumaric acid	2. Functional isomers
C.  and	3. Geometrical isomers
D.	4. Metamerism

- |     |   |   |   |   |
|-----|---|---|---|---|
|     | A | B | C | D |
| (a) | 2 | 3 | 1 | 4 |
| (b) | 2 | 1 | 3 | 4 |
| (c) | 4 | 2 | 1 | 3 |
| (d) | 4 | 1 | 2 | 3 |

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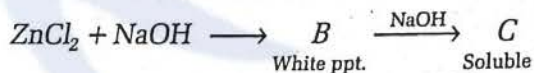
70. At 80°C, the vapour pressure of pure liquid A is 520 mm Hg and that of pure liquid B is 1000 mm Hg. If a mixture solution of A and B boils at 80°C and 1 atm pressure, the amount of A in the mixture is

- (a) 50 mol per cent (b) 54 mol per cent  
(c) 32 mol per cent (d) 44 mol per cent

71. The correct increasing order of solubility of the sulphates in water is

- (a)  $\text{BeSO}_4 > \text{MgSO}_4 > \text{CaSO}_4 > \text{SrSO}_4 > \text{BaSO}_4$   
(b)  $\text{BaSO}_4 > \text{SrSO}_4 > \text{CaSO}_4 > \text{MgSO}_4 > \text{BeSO}_4$   
(c)  $\text{BaSO}_4 > \text{CaSO}_4 > \text{SrSO}_4 > \text{BeSO}_4 > \text{MgSO}_4$   
(d)  $\text{BaSO}_4 > \text{SrSO}_4 > \text{MgSO}_4 > \text{CaSO}_4 > \text{BeSO}_4$

72. Consider the following reaction,



Then, the final product C is

- (a)  $\text{Na}_2\text{ZnO}_2$  (b)  $\text{Zn}(\text{OH})_2$   
(c)  $\text{ZnO}$  (d)  $\text{ZnSO}_4$

73. The vapour pressure of pure water is 23.5 mm Hg. Then, the vapour pressure of an aqueous solution which contains 5 mass percent of urea is (Molar mass of urea is 60).

- (a) 23 mm Hg (b) 18 mm Hg  
(c) 31 mm Hg (d) 35 mm Hg

74. Which of the following organic chloro compound shows stereochemical inversion during a  $\text{S}_\text{N}2$  reaction?

- (a)  $(\text{CH}_3)_3\text{CCl}$  (b)  $(\text{CH}_3)_2\text{CHCl}$   
(c)  $(\text{C}_2\text{H}_5)_2\text{CHCl}$  (d)  $\text{CH}_3\text{Cl}$

75. Consider the following reactions,  
 $\text{C}(\text{s}) + \text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g}), \Delta H = -94 \text{ kcal}$   
 $2\text{CO}(\text{g}) + \text{O}_2 \longrightarrow 2\text{CO}_2(\text{g}), \Delta H = -135.2 \text{ kcal}$   
Then, the heat of formation of  $\text{CO}(\text{g})$  is

- (a) 26.4 kcal (b) -26.4 kcal  
(c) 41.2 kcal (d) -41.2 kcal

76. If the  $\text{pK}_\text{a}$  of a weak acid HA is 4.80 and the  $\text{pK}_\text{b}$  of a weak base BOH is 4.78. Then, the pH of an aqueous solution of the corresponding salt, BA will be

- (a) 8.23 (b) 9.41 (c) 7.01 (d) 5.91

77. Which one of the following is the correct statement?

- (a)  $\text{B}_3\text{N}_3\text{H}_6$  is known as inorganic benzene  
(b) Chlorides of both beryllium and aluminium have bridged chloride structure in gas phase  
(c) Boric acid is a protonic acid  
(d) Beryllium exhibits coordination number of six

78. A nitrogenous substance A is treated with  $\text{HNO}_2$  and the product formed is further treated with  $\text{NaOH}$  solution which produces blue colouration. Then, A will be

- (a)  $\text{CH}_3\text{CH}_2\text{NH}_2$  (b)  $(\text{CH}_3)_2\text{CHNO}_2$   
(c)  $\text{CH}_3\text{CH}_2\text{NO}_2$  (d)  $\text{CH}_3\text{CH}_2\text{ONO}$

79. Argon crystallises in fcc arrangement and the density of solid and liquid Ar is  $1.59 \text{ g/cm}^3$  and  $1.42 \text{ g/cm}^3$ , respectively. The percentage of empty space in liquid Ar is

- (a) 34.84% (b) 43.8% (c) 23.4% (d) 21.6%

80. Which one of the following is an exothermic reaction?

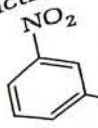
- (a)  $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 180.8 \text{ kJ} \longrightarrow 2\text{NO}(\text{g})$   
(b)  $\text{C}(\text{graphite}) + 2\text{S}(\text{s}) \longrightarrow \text{CS}_2(\text{l}) - 91.9 \text{ kJ}$   
(c)  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) - 92 \text{ kJ} \longrightarrow 2\text{NH}_3(\text{g})$   
(d)  $\text{C}(\text{g}) + \text{H}_2\text{O}(\text{g}) \longrightarrow \text{CO}(\text{g}) + \text{H}_2(\text{g}) - 131.1 \text{ kJ}$

81. When 4 A of current is passed through a 1.0 L, 0.10 M  $\text{Fe}^{3+}(\text{aq})$  solution for 1 h, it is partly reduced to  $\text{Fe}(\text{s})$  and partly of  $\text{Fe}^{2+}(\text{aq})$ . Identify the incorrect statement.

- (a) 0.10 mole of electrons are required to convert all  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$   
(b) 0.025 mol of  $\text{Fe}(\text{s})$  will be deposited  
(c) 0.075 mol of iron remains as  $\text{Fe}^{2+}$   
(d) 0.050 mol of iron remains as  $\text{Fe}^{2+}$

82. Which of the fo  
(a)  $\text{CO}_2$  and  $\text{SiO}_2$   
(b)  $\text{CO}_2$  is gas a  
(c)  $\text{CO}_2$  is a ga  
(d) Carbon ar  
properties

83. Identify th  
reactions



(c)

84. Giv

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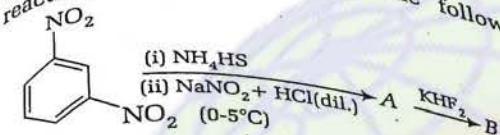
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84. Which of the following statement are correct?  
 (a) CO<sub>2</sub> and SiO<sub>2</sub> both are gases  
 (b) CO<sub>2</sub> is gas and SiO<sub>2</sub> is a liquid  
 (c) CO<sub>2</sub> is a gas but SiO<sub>2</sub> is a solid  
 (d) Carbon and Si both form oxides of similar properties

85. Identify the product B of the following reactions



- (a) (b)   
 (c) (d)

86. Given that,  $E_{Fe^{2+}/Fe}^{\circ} = -0.44 V$ ,  
 $E_{Fe^{2+}/Fe^{3+}}^{\circ} = -0.77 V$ . If Fe<sup>2+</sup>, Fe<sup>3+</sup> and Fe solid are kept together, then

- (a) Fe<sup>3+</sup> decreases  
 (b) Fe<sup>3+</sup> increases  
 (c) Fe<sup>2+</sup> decreases  
 (d) Fe<sup>2+</sup>, Fe<sup>3+</sup> remain unchanged

87. Which of the following compound in its anionic form is aromatic?

- (a) (b)   
 (c) (d)

88. In terms of Arrhenius equation,  $k = Ae^{-E_a/RT}$  the temperature dependence of rate constant (k) of a chemical reaction is written. Then, the activation energy (E<sub>a</sub>) of the reaction can be calculated by plotting.

- (a) log k vs  $\frac{1}{\log T}$   
 (b) log k vs  $\frac{1}{T}$   
 (c) k vs T  
 (d) k vs  $\frac{1}{\log T}$

87. Which one of the following electrolytes is most effective for the coagulation of Fe(OH)<sub>3</sub> sol?  
 (a) NaCl (b) Na<sub>2</sub>SO<sub>4</sub> (c) Na<sub>3</sub>PO<sub>4</sub> (d) As<sub>2</sub>S<sub>3</sub>

88.  $PhCH_2CH_3 \xrightarrow[(ii) H_3O^+]{(i) CO_2Cl_2/CCl_4} PhCH_2CHO$

The above reaction is an example of which name reaction?  
 (a) Rosenmund reduction  
 (b) Birch reduction  
 (c) Mendius reduction  
 (d) Etard reduction

89. Which of the following statement is applicable for Tyndall effect?  
 (a) The diameter of the dispersed particle is much smaller than the wavelength of the light used  
 (b) The diameter of the dispersed phase is much smaller than the wavelength of the light used  
 (c) The refractive indices of the dispersed phase and the dispersion medium must be same  
 (d) The refractive indices of the dispersed phase and the dispersion medium must differ greatly in magnitude

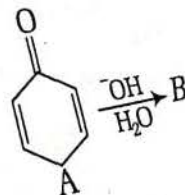
90. Match the following and choose the correct option.

Column I	Column II
A. Ribose	1. Ninhydrin
B. Biotin	2. Nucleic acid
C. Enzyme	3. Vitamin
D. Glycine	4. Globular protein

- (a) 1 4 2 3  
 (b) 2 3 4 1  
 (c) 1 2 3 4  
 (d) 2 3 1 4

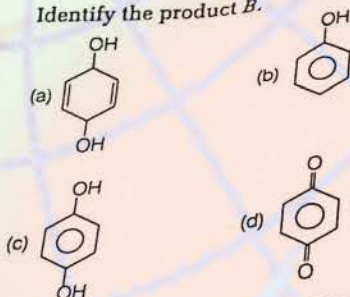
91. On reduction of glycolic acid with HI, the product formed is  
 (a) acetic acid (b) iodo acetic acid  
 (c) formic acid (d) None of these

92. Consider the following reaction,



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Identify the product B.



93. Arrange the following compounds in the increasing order of their reactivity towards HCN.

- I. Acetaldehyde
- II. Acetone
- III. Di-*tert*-butyl ketone
- IV. Methyl-*tert*-butyl ketone

- (a) III < II < IV < I
- (b) II < I < IV < III
- (c) IV < III < II < I
- (d) II < IV < I < III

94. The enolic form of acetone contains

- (a) 10  $\sigma$ -bonds, 2 $\pi$ -bonds and 1 lone pair
- (b) 9  $\sigma$ -bonds, 2 $\pi$ -bonds and 2 lone pairs
- (c) 8  $\sigma$ -bonds, 2 $\pi$ -bonds and 2 lone pairs
- (d) 9  $\sigma$ -bonds, 1 $\pi$ -bond and 2 lone pairs

95. The magnetic moment of  $M^{x+}$  (atomic number = 25) is  $\sqrt{15}$  BM. Then, the oxidation number  $x$  of  $M$  is

- (a) 3
- (b) 4
- (c) 2
- (d) 1

96. When 0.1 M NaOH is titrated with 0.1 M, 20 mL HA till the end point,  $K_a(\text{HA}) = 6 \times 10^{-6}$  and degree of dissociation of HA is small as compared to unity. What is the pH of the resulting solution at the end point?

- (a) 6.23
- (b) 9.22
- (c) 7.21
- (d) 8.95

97. Arrange the following in the decreasing order of basic character.

- I. *p*-toluidine
- II. *N,N*-dimethyl-*p*-toluidine
- III. *p*-nitroaniline
- IV. Aniline

- (a) II > III > I > IV
- (b) I > II > III > IV
- (c) II > I > IV > III
- (d) IV > III > I > II

98. What is the enthalpy of the disproportionation of MgCl if the enthalpy of formation of hypothetical MgCl is  $-125$  kJ/mol and the  $\text{MgCl}_2$  is  $-642$  kJ/mol?

- (a)  $-767$  kJ/mol
- (b)  $767$  kJ/mol
- (c)  $-392$  kJ/mol
- (d)  $392$  kJ/mol

99. The decreasing order of reactivity towards electrophilic addition of the following is

- I.  $\text{CH}=\text{CH}$
- II.  $\text{CH}_2=\text{CH}_2$
- III.  $\text{H}_2\text{C}=\text{CH}-\text{Cl}$
- IV.  $\text{HC}=\text{CH}$   
 $\begin{array}{c} | \quad | \\ \text{Cl} \quad \text{Cl} \end{array}$

- (a) I > II > III > IV
- (b) II > I > III > IV
- (c) IV > III > I > II
- (d) IV > III > II > I

100. Given the following bond dissociation enthalpies (kJ mol<sup>-1</sup>).

$$\text{P} \equiv \text{P} - 490, \text{P} - \text{P} - 209, \text{N} \equiv \text{N} - 946, \text{N} - \text{N} - 160$$

Compare the enthalpy changes for the process

- (i)  $2\text{P}_2(\text{g}) \longrightarrow \text{P}_4(\text{g})$
- (ii)  $2\text{N}_2(\text{g}) \longrightarrow \text{N}_4(\text{g})$

Choose the correct option.

- (a)  $\text{P}_4$  is feasible but  $\text{N}_4$  is not feasible
- (b)  $\text{P}_4$  is not feasible but  $\text{N}_4$  is feasible
- (c) Both  $\text{P}_4$  and  $\text{N}_4$  are feasible
- (d) Both  $\text{P}_4$  and  $\text{N}_4$  are not feasible

**Biology**

... tissues like xylem and phloem, etc, from which of the following  
 ... cambium  
 ... cambium  
 ... lateral meristem

... *Myxogonyx* and *Chlorella*, earlier placed in algae within plants (both having cell wall) are now placed together in which kingdom. Choose the correct option.  
 (b) Animalia  
 (d) Monera

... Fungi  
 ... Protista

... of the following statement is incorrect about chordates?  
 Chordates are bilaterally symmetrical.  
 Notochord is present at some stage of life.  
 Non-segmented, false segmented or true metamericly segmented animals.  
 Gill clefts present at some stage of life.

... of the following scientific names given below, identify the option written incorrectly.  
 (a) *Mangifera indica*  
 (b) *Trypanosoma gambiense*  
 (c) *Apis indica*  
 (d) *Leo panthera*

... The most commonly occurring species of an earthworm in India is  
 (a) *Pheretima communissima*  
 (b) *Eutyphacus*  
 (c) *Pheretima posthuma*  
 (d) *Lumbricus*

... Which type of ribosomal subunit are found in prokaryotic cells?  
 (a) 80 S (60 S + 40 S)  
 (b) 80 S (30 S + 50 S)  
 (c) 70 S (35 S + 35 S)  
 (d) 70 S (50 S + 30 S)

... Identify the correct statement about the fluid mosaic model of cell membrane.  
 (a) It was proposed by J David Robertson in 1972.  
 (b) Model resembles the iceberg (as proteins) floating in the sea (of phospholipids).  
 (c) Hydrophilic phosphate head of phospholipids face inwards.  
 (d) Hydrocarbon tails face outward.

108. If more than one nucleoli are seen in the nucleus of cell. What does it corresponds to?  
 (a) Presence of false nucleoli  
 (b) Absence of true nucleoli  
 (c) Breakage in nucleolus  
 (d) None of the above
109. Polytene or salivary gland chromosome (giant chromosomes) were first observed by  
 (a) Du Praw (b) Balbiani  
 (c) Flemming (d) Ruckert
110. Synaptonemal complex is a structure of  
 (a) cytokinesis  
 (b) terminalisation  
 (c) chromosomal disfunction  
 (d) chromosomal pairing
111. Addition of 4-sphingosine instead of glycerol in addition to fatty acids and choline lead to formation of  
 (a) sphingosine (b) sphingomyelins  
 (c) sphingophospholipids (d) cerebroside
112. Which of the following acts as an isomerase enzyme?  
 (a) Phosphoglucomutase (b) Fumerases  
 (c) Transphosphorylases (d) Nitrate reductase
113. Addition of a competitive inhibitor to any reaction mixture will  
 (a) decrease  $k_m$  (b) decrease  $V_{max}$   
 (c) increase  $k_m$  (d) increase  $V_{max}$
114. The value of water potential for any given solute is always  
 (a) insignificant (b) negative  
 (c) slightly negative (d) positive
115. Radioactive  $CO_2$  ( $^{14}CO_2$ ) is added to the suspension of a photosynthesising green algae. Which compound of the following will be labelled first with  $^{14}CO_2$ ?  
 (a) Glucose (b) RuBP  
 (c) GP(PGA) (d) Triose phosphate
116. ATP is the most important molecule released during all the respiratory cycles. Which one of the following is true about ATP?  
 (a) ATP is prosthetic part of an enzyme  
 (b) ATP is an enzyme  
 (c) ATP is an organic ion of an enzyme  
 (d) ATP is a coenzyme

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 ... seeds are  
 ... observed.  
 ... and other  
 ... tions in  $F_2$   
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 ... resembles  
 ... age.

... hybrid  
 ... elps in  
 ... type or

... 3.  
 ... tional



12 BCECE (Medical) Solved Paper 2015

117. Morphogenesis inducing hormone used in plant tissue culture is  
 (a) abscisic acid (b) gibberellins  
 (c) cytokinins (d) 2, 4-D
118. Specialised phagocytic cells of liver present in sinusoidal wall are  
 (a) macrophages (b) nematocytes  
 (c) Kupffer cells (d) oxyntic cells
119. 'Bundle of His' comprises a network of  
 (a) nerve fibres distributed throughout ventricles  
 (b) nerve fibres present in ventricles  
 (c) muscle fibres present throughout the heart walls  
 (d) muscle fibres distributed in ventricle wall only
120. Trigone in excretory system is  
 (a) a urine filled cavity within the kidney  
 (b) a muscular sphincter at the neck of the urinary bladder  
 (c) a smooth connective tissue region in the urinary bladder  
 (d) a tunic of the ureter
121. A fractured coracoid process would involve the  
 (a) clavicle (b) scapula  
 (c) ulna (d) radius
122. A hormone which also acts as a neurotransmitter is  
 (a) vasopressin (b) epinephrine  
 (c) thyroxine (d) insulin
123. In which phase of cell division will you observe the phenomenon of congression?  
 (a) Prophase (b) Metaphase  
 (c) Anaphase (d) Telophase
124. A person met with an accident and was diagnosed with memory loss. Choose the correct option for the part of brain injured in the accident.  
 (a) Hippocampus (b) Diencephalon  
 (c) Cerebrum (d) Amygdala
125. The inactive form of the gastric enzymes is  
 (a) argentaffin (b) zymogens  
 (c) oxyntic (d) None of these
126. Native people of plain areas moves to hilly areas, after a few months will have  
 (a) physically unfit to indulge in high energy games  
 (b) have normal blood (RBC) count with Hb having high binding affinity to O<sub>2</sub>  
 (c) have increased count of RBC, Hb shows decreased affinity to O<sub>2</sub>  
 (d) suffer from nausea, fatigue and other symptoms of altitude sickness
127. Eggs having yolk sac in their centre and cytoplasm in peripheral layer are called  
 (a) homolecithal  
 (b) meiolecithal  
 (c) centrolecithal  
 (d) telolecithal
128. Which of the following is a diploid cell?  
 (a) Spermatid  
 (b) Secondary spermatocyte  
 (c) Spermatogonium  
 (d) Spermatozoa
129. Given below are few comments regarding Medical Termination of Pregnancy (MTP). Identify the true statement.  
 (a) Government of India legalised MTP in 1970.  
 (b) MTPs are considered relatively safe up to 12 weeks of pregnancy.  
 (c) Majority of MTPs are legally performed by qualified doctors to an abort healthy child.  
 (d) Amniocentesis demotivates people to carry on MTP.
130. Pasteur's experiment to refute the theory of spontaneous generation was successful as spontaneous generation did not occur in his set up because  
 (a) he did not boil the flask for long  
 (b) the S-shaped flask used by Pasteur prevented the contamination of broth by air  
 (c) extreme precautions were used by him to kept his flask covered  
 (d) he used fine muslin cloths to cover his experimental set up
131. A connecting link between the Annelida and Arthropoda is  
 (a) Proterospongia (b) Neopilina  
 (c) Archaeopteryx (d) Peripatus
132. Dihybrid test-cross results in ratio of  
 (a) 9 : 3 : 3 : 1 (b) 1 : 2 : 4 : 1  
 (c) 3 : 1 : 1 : 3 (d) 1 : 2
133. The direct ancestor of living modern man  
 (a) Cro-magnon man  
 (b) Neanderthal man  
 (c) Heidelberg man  
 (d) Homo habilis

... genotype of one of the ... appropriate?  
 (a) Back cross  
 (b) Back cross  
 (c) None of these

... flow of genetic information is correctly  
 (a) DNA → mRNA → RNA → proteins  
 (b) mRNA → DNA → proteins  
 (c) DNA → DNA → proteins  
 (d) mRNA → DNA → proteins

... among the following is not involved in  
 formation of a eukaryotic transcription  
 initiation complex?  
 (a) RNA polymerase-II  
 (b) RNA polymerase-I  
 (c) TATA box  
 (d) Promoter

... individual contracted an allergic  
 reaction and started wheezing and  
 coughing. In response the body's cell secrete  
 some chemicals against allergens, which  
 among those given below are?  
 (a) Histamine  
 (b) Threonine  
 (c) Melatonin  
 (d) Sebum

... malignant cancer cells can cross the cellular  
 barriers and spread themselves, causing  
 cancer in any part of the body, this property  
 of cancer cells is  
 (a) contact inhibition  
 (b) malignancy  
 (c) metastasis  
 (d) cellular adherence

... LSD, morphine and bhang are derived from  
 (a) Theobroma, Papaver and Cannabis  
 (b) Claviceps, Papaver and Cannabis  
 (c) Cannabis, Erythroxylon and Theobroma  
 (d) Rauwolfia, Cannabis and Papaver

... Splenic fever occurs in cattles, goats, camel  
 and sheep etc., and is caused by  
 (a) Corynebacterium pyogenes  
 (b) Cowpox virus  
 (c) Klebsiella pneumoniae  
 (d) Bacillus anthracis

... Triticale the first man made cereal is a cross  
 between  
 (a) wheat and millet  
 (b) wheat and Sorghum

142. After an organ transplant operation, a doctor prescribed an immuno suppressant drug to the patient. Which of the following would thus be included in for this purpose?  
 (a) Streptokinase  
 (b) Cyclosporin-A  
 (c) Statins  
 (d) Cephalosporins
143. The antisense construct of 'ACC' synthase gene (RNA) was used in production of  
 (a) Bt maize  
 (b) Bt cotton  
 (c) Golden rice  
 (d) Flavr savr (tomato)
144. T-DNA, extensively used in genetic engineering procedures is extracted from  
 (a) Bacillus thermus aquaticus  
 (b) Caenorhabditis elegans  
 (c) Agrobacterium tumefaciens  
 (d) Bacillus thuringiensis
145. Persistent notochord is the feature of which among the following?  
 (a) Chondrichthyes  
 (b) Cyclostomata  
 (c) Loa loa  
 (d) None of these
146. The most productive ecosystem is  
 (a) ocean  
 (b) desert  
 (c) grasslands  
 (d) temperate forests
147. Critically Endangered (CR) species are  
 (a) whose last individual has died  
 (b) liable to become extinct if not allowed to realize their full biotic potential  
 (c) those facing an extremely high risk of extinction in immediate future  
 (d) low risk species
148. India's first national park was established in which year and known as?  
 (a) 1970, Hailey National Park  
 (b) 1974, Bandipur National Park  
 (c) 1975, Gir National Park  
 (d) 1935, Jim Corbett National Park
149. In which zone of the biosphere activity is permitted?  
 (a) Buffer zone  
 (b) Core  
 (c) Manipulation zone  
 (d) All
150. The thinning of egg shell and breaking is causing a population in certain area. A reason for this could be  
 (a) biomagnification of DDT  
 (b) eutrophication by fertilizers  
 (c) excessive use of organic manure  
 (d) faulty calcium metabolism

## Answers

### Physics

1. (b) 2. (a) 3. (d) 4. (c) 5. (d)  
 11. (d) 12. (c) 13. (c) 14. (a) 15. (b)  
 21. (a) 22. (d) 23. (a) 24. (a) 25. (c)  
 31. (d) 32. (a) 33. (b) 34. (c) 35. (d)  
 41. (a) 42. (a) 43. (d) 44. (b) 45. (a)

### Chemistry

51. (c) 52. (d) 53. (d) 54. (c) 55. (a) 56. (c)  
 61. (c) 62. (c) 63. (c) 64. (a) 65. (a) 66. (b)  
 71. (a) 72. (a) 73. (a) 74. (d) 75. (b) 76. (c)  
 81. (d) 82. (c) 83. (b) 84. (a) 85. (a) 86. (b)  
 91. (a) 92. (c) 93. (c) 94. (d) 95. (b) 96. (d)

### Biology

101. (c) 102. (c) 103. (c) 104. (a) 105. (c) 106. (d) 107. (b)  
 111. (c) 112. (a) 113. (c) 114. (b) 115. (c) 116. (d) 117. (c)  
 121. (b) 122. (b) 123. (b) 124. (a) 125. (b) 126. (c) 127. (c)  
 131. (d) 132. (a) 133. (a) 134. (b) 135. (b) 136. (b) 137. (b)  
 141. (d) 142. (b) 143. (d) 144. (c) 145. (b) 146. (a) 147. (c)

8. (d) 9. (a) 10. (a)  
 18. (b) 19. (c) 20. (b)  
 28. (c) 29. (d) 30. (a)  
 38. (c) 39. (a) 40. (d)  
 48. (d) 49. (a) 50. (b)

58. (b) 59. (b) 60. (b)  
 68. (c) 69. (a) 70. (a)  
 78. (b) 79. (a) 80. (c)  
 88. (d) 89. (d) 90. (b)  
 98. (c) 99. (b) 100. (a)

108. (a) 109. (b) 110. (d)  
 118. (c) 119. (c) 120. (c)  
 128. (c) 129. (b) 130. (c)  
 138. (b) 139. (b) 140. (d)  
 148. (d) 149. (b) 150. (a)

## Solutions

### Physics

1. We know that range of a projectile

$$R = \frac{U^2 \sin 2\theta}{g}$$

Here

$$R = 6 + 18 = 24$$

∴

$$\frac{U^2 \sin 2\theta}{g} = 24$$

...(i)

The equation of trajectory of a projectile

$$y = x \tan \theta - \frac{gx^2}{2U^2 \cos^2 \theta}$$

$$3 = 6 \tan \theta - \frac{36g}{2U^2 \cos^2 \theta}$$

From Eq. (i),  $\frac{g}{U^2} = \frac{\sin 2\theta}{24}$

$$= \frac{\sin \theta \cos \theta}{12}$$

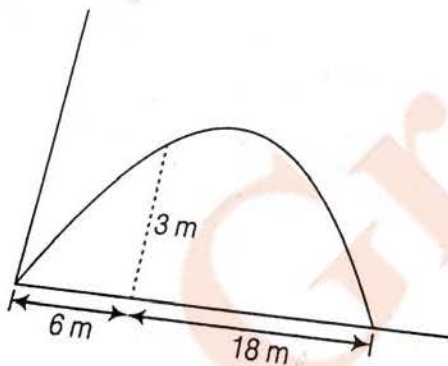
Substituting in Eq. (ii), we get

$$3 = 6 \tan \theta - \frac{3}{2}$$

$$\tan \theta = \frac{9}{2} \tan \theta$$

⇒

$$\theta = \tan^{-1} \left( \frac{2}{3} \right)$$



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