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Sr. No. ....

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**BPH-EE-2013**

*Opened at 4:00 P.M*

*AA-EE-13*  
Code  
*24/6/13*



Time : 1¼ hours (75 minutes) Total Questions : 130 Max. Marks : 100

Candidate's Name \_\_\_\_\_ Date of Birth \_\_\_\_\_

Father's Name \_\_\_\_\_ Mother's Name \_\_\_\_\_

Roll No. (in figure) \_\_\_\_\_ (in words) \_\_\_\_\_

Date of Exam. : \_\_\_\_\_

\_\_\_\_\_  
(Signature of the Invigilator)

\_\_\_\_\_  
(Signature of the candidate)

**CANDIDATES MUST READ THE FOLLOWING INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER & FOLLOW THEM.**

1. All questions under Part-A and Part-B are compulsory. Part-C is optional. The candidates may attempt either Optional Part-C (i) OR Optional Part-C (ii). All questions carry equal marks i.e. one mark each.
2. The candidate MUST return this question book-let and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
3. The candidate MUST NOT do any rough work OR writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself.
4. In case there is any discrepancy in any question(s) in the Question Book-let, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
5. Use only blue or black ball point pen of good quality in the OMR Answer-Sheet.
6. There will be no negative marking. Each correct answer will be awarded one mark. Cutting, erasing, overwriting and more than one answer in the OMR Answer-Sheet will be treated as wrong answer.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT & COMPLETE QUESTION BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER THE START OF EXAMINATION.



## Part-A (Physics)

Question No.	Questions
1.	<p>Under the action of a force <math>F = Cx</math>, the position of a body changes from 0 to <math>x</math>. The work done is</p> <p>(1) <math>\frac{1}{2} Cx^2</math> (2) <math>Cx^2</math> (3) <math>Cx</math> (4) <math>\frac{1}{2} Cx</math></p>
2.	<p>The angle turned by a body undergoing circular motion depends on time as <math>\theta = \theta_0 + \theta_1 t + \theta_2 t^2</math>. Then the angular acceleration of the body is</p> <p>(1) <math>\theta_1</math> (2) <math>\theta_2</math> (3) <math>2\theta_1</math> (4) <math>2\theta_2</math></p>
3.	<p>A rocket of mass 1000 kg exhaust gases at a rate of 4kg/s with a velocity 3000 m/s. The thrust developed on the rocket is</p> <p>(1) 12000 N (2) 120 N (3) 800 N (4) 200 N</p>
4.	<p>If <math>\lambda</math> is the wavelength of hydrogen atom from the transition <math>n = 3</math> to <math>n = 1</math>, then what is the wavelength of doubly ionized lithium ion for the same transition</p> <p>(1) <math>\frac{\lambda}{3}</math> (2) <math>3\lambda</math> (3) <math>\frac{\lambda}{9}</math> (4) <math>9\lambda</math></p>
5.	<p>The dimensions of pressure gradient are</p> <p>(1) <math>ML^{-2}T^{-2}</math> (2) <math>ML^{-2}T^{-1}</math> (3) <math>ML^{-1}T^{-1}</math> (4) <math>ML^{-1}T^{-2}</math></p>











Question No.	Questions
15.	<p>An elastic string has a length <math>l</math> when tension in it is 5N. Its length is <math>h</math> when tension is 4N. On subjecting the string to a tension of 9N, its length will be</p> <p>(1) <math>l+h</math> (2) <math>l-h</math>  (3) <math>5l-4h</math> (4) <math>\frac{l+h}{h-l}</math></p>
16.	<p>The period of oscillations of a mass 1.6 kg suspended from a spring is 2 seconds. If along with it another mass <math>m</math> kg is also suspended, the period of oscillations increases by one second. The mass <math>m</math> is</p> <p>(1) 1 kg (2) 2 kg  (3) 1.6 kg (4) 2.6 kg</p>
17.	<p>Two coherent sources must have the same</p> <p>(1) Amplitude (2) Phase difference only  (3) Frequency only (4) Phase difference and frequency</p>
18.	<p>When a source is going away from a stationary observer with a velocity equal to that of sound in air, the frequency heard by observer will be</p> <p>(1) Same (2) Double  (3) Half (4) One third</p>
19.	<p>Ultrasonic waves are produced by</p> <p>(1) Piezoelectric effect (2) Peltier's effect  (3) Doppler's effect (4) None of these</p>
20.	<p>Fundamental frequency of a sonometer wire is <math>n</math>. If the length, tension and diameter of the wire are tripled, the new fundamental frequency is</p> <p>(1) <math>\frac{n}{\sqrt{3}}</math> (2) <math>\frac{n}{3}</math>  (3) <math>n\sqrt{3}</math> (4) <math>\frac{n}{3\sqrt{3}}</math></p>



Question No.	Questions
21.	<p>The magnitude of electric field strength <math>E</math> such that an electron placed in it would experience an electric force equal to its weight is given by</p> <p>(1) <math>mge</math> (2) <math>\frac{mg}{e}</math>  (3) <math>\frac{e}{mg}</math> (4) <math>\frac{e^2g}{2m}</math></p>
22.	<p>The electric potential at the surface of an atomic nucleus (<math>z=50</math>) of radius 9 Fermi is</p> <p>(1) 80 Volt (2) <math>8 \times 10^6</math>  (3) 9V (4) <math>9 \times 10^5V</math></p>
23.	<p>A charge <math>Q</math> is distributed uniformly in a sphere (solid). Then the electric field at any point <math>r</math> where <math>r &lt; R</math> (<math>R</math> is radius of sphere) varies as</p> <p>(1) <math>r^{1/2}</math> (2) <math>r^{-1}</math>  (3) <math>r</math> (4) <math>r^{-2}</math></p>
24.	<p>At a point on the axis of an electric dipole ;</p> <p>(1) The electric field <math>E</math> is zero  (2) The electric potential <math>V</math> is zero  (3) Neither <math>E</math> nor <math>V</math> is zero  (4) Both <math>E</math> and <math>V</math> are zero</p>
25.	<p>The quantity in electricity analogous to temperature is</p> <p>(1) inductance (2) charge  (3) resistance (4) potential</p>







Question No.	Questions
31.	<p>The electromagnetic damping experienced by a metal mass moving in a magnetic field is due to</p> <p>(1) Alternating current  (2) Eddy current  (3) Magnetic field  (4) Alternating potential produced in metallic mass</p>
32.	<p>The value of current at resonance in a series LCR circuit is affected by the value of</p> <p>(1) R only  (2) C only  (3) L only  (4) L, C and R</p>
33.	<p>In which of the following regions of electromagnetic spectrum will the vibrational motion of molecules give rise to absorption ?</p> <p>(1) Ultraviolet  (2) Microwave  (3) Infrared  (4) Radio waves</p>
34.	<p>If the refracting angle of a prism is <math>60^\circ</math> and the minimum deviation <math>30^\circ</math>, the angle of incidence will be</p> <p>(1) <math>30^\circ</math>  (2) <math>45^\circ</math>  (3) <math>60^\circ</math>  (4) <math>90^\circ</math></p>
35.	<p>The impurity concentration in a normal diode is equal to</p> <p>(1) 1 in <math>10^9</math> Parts  (2) 1 in <math>10^6</math> parts  (3) 1 in <math>10^3</math> parts  (4) 1 in <math>10^2</math> parts</p>











Question No.	Questions
45.	<p>The paramagnetic species is :</p> <p>(1) <math>\text{KO}_2</math> (2) <math>\text{SiO}_2</math> (3) <math>\text{TiO}_2</math> (4) <math>\text{BaO}_2</math></p>
46.	<p>A solid compound 'X' on heating gives <math>\text{CO}_2</math> gas and a residue. The residue mixed with water forms 'Y'. On passing an excess of <math>\text{CO}_2</math> through 'Y' in water, a clear solution 'Z' is obtained. On boiling 'Z' compound 'X' is reformed. The compound 'X' is</p> <p>(1) <math>\text{Ca}(\text{HCO}_3)_2</math> (2) <math>\text{CaCO}_3</math> (3) <math>\text{Na}_2\text{CO}_3</math> (4) <math>\text{K}_2\text{CO}_3</math></p>
47.	<p>The wrong statement about fullerene is</p> <p>(1) It has 5-membered Carbon ring (2) It has 6-membered Carbon ring (3) It has <math>\text{sp}^2</math> hybridization (4) It has 5-membered rings more than 6-membered rings</p>
48.	<p>The chemical composition of cryolite mineral is</p> <p>(1) <math>\text{Al}_2\text{O}_3</math> (2) <math>\text{Al}_2\text{O}_3 \cdot 12\text{H}_2\text{O}</math> (3) <math>\text{KAlSi}_3\text{O}_8</math> (4) <math>\text{Na}_3\text{AlF}_6</math></p>



Question No.	Questions
49.	<p><math>\text{CH}_3 - \text{CHCl} - \text{CH}_2 - \text{CH}_3</math> has a chiral centre, which one of the following represents its R configuration ?</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) <math>\begin{array}{c} \text{C}_2\text{H}_5 \\   \\ \text{H} - \text{C} - \text{CH}_3 \\   \\ \text{Cl} \end{array}</math></p> </div> <div style="text-align: center;"> <p>(2) <math>\begin{array}{c} \text{C}_2\text{H}_5 \\   \\ \text{Cl} - \text{C} - \text{CH}_3 \\   \\ \text{H} \end{array}</math></p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) <math>\begin{array}{c} \text{CH}_3 \\   \\ \text{H} - \text{C} - \text{Cl} \\   \\ \text{C}_2\text{H}_5 \end{array}</math></p> </div> <div style="text-align: center;"> <p>(4) <math>\begin{array}{c} \text{C}_2\text{H}_5 \\   \\ \text{H}_3\text{C} - \text{C} - \text{Cl} \\   \\ \text{H} \end{array}</math></p> </div> </div>
50.	<p>Wurtz reaction is best used for making :</p> <p>(1) Unbranched alkanes      (2) Symmetrical alkanes</p> <p>(3) Unsymmetrical alkanes      (4) n-alkanes with odd number of carbons</p>
51.	<p>Which of the following gases is not a green house gas ?</p> <p>(1) CO      (2) O<sub>3</sub></p> <p>(3) CH<sub>4</sub>      (4) H<sub>2</sub>O vapour</p>
52.	<p>The edge length of face centred unit cubic cell is 508 pm. The radius of the atom will be</p> <p>(1) 179.6 pm      (2) 288 pm</p> <p>(3) 618 pm      (4) 398 pm</p>

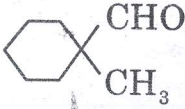
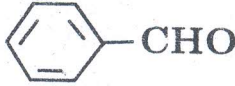






Question No.	Questions
59.	Oxygen molecules shows : (1) Diamagnetism (2) Paramagnetism (3) Ferromagnetism (4) Ferrimagnetism
60.	Identify the molecular formula of tear gas : (1) $\text{COCl}_2$ (2) $\text{CCl}_3\text{NO}_2$ (3) $\text{CCl}_3\text{CHO}$ (4) None of above
61.	$\text{XeF}_6$ on complete hydrolysis gives : (1) Xe (2) $\text{XeO}_2$ (3) $\text{XeO}_3$ (4) $\text{XeO}_4$
62.	When one mol $\text{CrCl}_3 \cdot 6 \text{H}_2\text{O}$ is treated with excess of $\text{AgNO}_3$ , 3 mol of $\text{AgCl}$ are obtained. The formula of the complex is : (1) $[\text{CrCl}_3(\text{H}_2\text{O})_3] \cdot 3 \text{H}_2\text{O}$ (2) $[\text{Cr}(\text{H}_2\text{O})_6] \text{Cl}_3$ (3) $[\text{CrCl}_2(\text{H}_2\text{O})_4] \text{Cl} \cdot 2 \text{H}_2\text{O}$ (4) $[\text{CrCl}(\text{H}_2\text{O})_5] \text{Cl}_2 \cdot \text{H}_2\text{O}$
63.	Electronic configuration of a transition element X in +3 oxidation state is $[\text{Ar}] 3d^5$ , what is its atomic number ? (1) 25 (2) 26 (3) 27 (4) 24
64.	Ethylidene chloride is a / an (1) vic-dihalide (2) gem-dihalide (3) allylic halide (4) vinylic halide



Question No.	Questions
65.	Phenol is less acidic than (1) ethanol (2) o-nitrophenol (3) o-methyl phenol (4) o-methoxyphenol
66.	Cannizaro's reaction is not given by : (1)  (2)  (3) HCHO (4) CH <sub>3</sub> CHO
67.	Picric acid is (1) Trinitroaniline (2) Trinitrotoluene (3) Volatile liquid (4) 2, 4, 6 - trinitrophenol
68.	Which of the following acid is a Vitamin ? (1) Aspartic acid (2) Ascorbic acid (3) Adipic acid (4) Saccharic acid
69.	The commercial name of polyacrylonitrile is (1) Dacron (2) Orlon (3) PVC (4) Bakelite
70.	Equanil is : (1) artificial sweetener (2) tranquilizer (3) anti histamine (4) antifertility drug



## Part-C Option (i) (Mathematics)

Question No.	Questions
71.	If $X = \{1, 2, 3\}$ , $Y = \{3, 4\}$ , $Z = \{4, 5, 6\}$ then $X \cup (Y \cap Z)$ is (1) $\{4, 5\}$ (2) $\{1, 2, 5, 6\}$ (3) $\{1, 2, 3, 4\}$ (4) $\{1, 3, 6\}$
72.	Let $A = \{(a, b) : a^2 + b^2 = 1, a, b \in \mathbb{R}\}$ . Then A is (1) symmetric (2) antisymmetric (3) reflexive (4) transitive
73.	If $f(x) = 2x^n + K$ , $f(2) = 26$ and $f(4) = 138$ , then $f(3) =$ (1) 86 (2) 32 (3) 56 (4) 64
74.	If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$ , then $\cos \theta - \sin \theta =$ (1) $-\sqrt{2} \cos \theta$ (2) $\sqrt{2} (\cos \theta + \sin \theta)$ (3) $-\sqrt{2} \sin \theta$ (4) $\sqrt{2} \sin \theta$
75.	If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ , then $\frac{\tan x}{\tan y} =$ (1) $\frac{b}{a}$ (2) $\frac{a}{b}$ (3) $\frac{a-b}{a+b}$ (4) $ab$



Question No.	Questions
76.	If $ z ^2 + 1 =  z^2 - 1 $ , then $z$ lies on (1) circle (2) ellipse. (3) parabola (4) none of these
77.	The inequalities $3x - y \geq 3$ , $4x - y > 4$ have (1) solution for all $x$ (2) solution for all $y$ (3) solution for positive $x$ and $y$ (4) no solution for positive $x$ and $y$
78.	Three dice are rolled. The number of possible outcomes in which at least one die shows 3 is (1) 36 (2) 42 (3) 81 (4) 91
79.	If ${}^n P_r = 120 {}^n C_r$ , then the value of $r$ is (1) 3 (2) 4 (3) 5 (4) 6
80.	In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^{15}$ , the constant term is (1) ${}^{15}C_9$ (2) ${}^{-15}C_9$ (3) 0 (4) $\frac{3}{2}$











Question No.	Questions
91.	$\cos^{-1} \frac{1}{2} + 3 \sin^{-1} \frac{1}{2} =$ (1) $\frac{\pi}{6}$ (2) $\frac{4\pi}{3}$ (3) $\frac{3\pi}{4}$ (4) $\frac{5\pi}{6}$
92.	If $w$ is one of the cube roots of unity, then $\begin{vmatrix} 1 & w & w^2 \\ w & 1 & w^2 \\ w^2 & w & 1 \end{vmatrix} =$ (1) $w^2$ (2) $w$ (3) $0$ (4) $1$
93.	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ x & y & -1 \end{bmatrix}$ , then $A^2 =$ (1) $I_3$ (2) $A$ (3) $-A$ (4) $I_2$
94.	If $f(x) = \begin{cases} mx+1, & x \leq \frac{\pi}{2} \\ \sin x + n, & x > \frac{\pi}{2} \end{cases}$ and $f(x)$ is continuous at $x = \frac{\pi}{2}$ , then (1) $m = \frac{n\pi}{2} + 1$ (2) $m = n = \frac{\pi}{2}$ (3) $n = m \frac{\pi}{2}$ (4) $m=1, n=0$







Question No.	Questions
101.	Hydroponics is : (1) Soil less culture (2) Water less culture (3) Air less culture (4) Nutrient less culture
102.	Bt crop grown by the farmers in India is : (1) Maize (2) Wheat (3) Cotton (4) Tomato
103.	Age of tree can be estimated by : (1) Height and girth (2) Biomass (3) Cork (4) Number of Annual rings
104.	In DNA, adenine normally pair with : (1) Guanine (2) Cytosine (3) Thymine (4) Uracil
105.	The genotypic ratio of monohybrid cross is : (1) 3 : 1 (2) 9 : 3 : 3 : 1 (3) 1 : 1 (4) 1 : 2 : 1
106.	Gene therapy is : (1) Method to determine blood group (2) Method to replace a defective gene with a healthy gene (3) Method to determine evolution (4) All of the above



Question No.	Questions
107.	Hardy-Weinberg law in a population represents (1) Allele frequency (2) Heterozygote frequency (3) Genotype frequency (4) Homozygote frequency
108.	A mother of blood group O has a group O child, the father could be of blood type. (1) A or B or O (2) A or B (3) O only (4) A B only
109.	Interspecific hybrids proved very useful for : (1) Gene function (2) Gene mapping (3) Gene structure (4) Genetic manipulation
110.	Systematics deals with : (1) Classification of organisms (2) Identification of organisms (3) The kind and diversity of all organisms and existing relationships among themselves (4) None of the above
111.	Down syndrome is usually the result of an extra chromosome : (1) 15 (2) 17 (3) 19 (4) 21
112.	The two strands of DNA are joined by : (1) Covalent Bond (2) Ionic Bond (3) Hydrogen Bond (4) Phosphodiester Bond







Question No.	Questions
119.	Goitre is caused by (1) Over eating (2) Deficiency of Iron (3) Deficiency of Iodine (4) Deficiency of Vitamins
120.	Testosterone is secreted by : (1) Histocyte (2) Sertoli cells (3) Leydig cells (4) Primary spermatocyte
121.	The protective covering of brain is : (1) Pleura (2) Meninges (3) Pericardium (4) Peritonium
122.	Fertilization of ova in human takes place in : (1) Uterus (2) Vagina (3) Fallopian tube (4) Ovary
123.	Carbon monoxide poisoning is due to the formation of : (1) Methane (2) Carbonic acid (3) Carboxy haemoglobin (4) Oxy-haemoglobin
124.	Abnormal secondary growth is found in : (1) Cucurbita (2) Dracaena (3) Triticum (4) Sugarcane



Question No.	Questions
125.	Which is the causative organism of Typhoid ? (1) <i>Salmonella typhi</i> (2) <i>Mycobacterium typhi</i> (3) <i>Plasmodium falciparum</i> (4) All of the above
126.	Vinegar is obtained from mollasses with the help of : (1) <i>Aspergillus</i> (2) <i>Rhizopus</i> (3) <i>Acetobacter</i> (4) <i>Penicillium</i>
127.	The amount of ATP required for the synthesis of one glucose molecule in $C_4$ pathway is : (1) 18 ATP (2) 20 ATP (3) 28 ATP (4) 30 ATP
128.	What are the natural reservoir of phosphorus ? (1) Rock (2) Animal bones (3) Sea water (4) Plants
129.	The tropical forests in India are located in : (1) Haryana (2) Himachal Pradesh (3) Jammu & Kashmir (4) Andamans
130.	Which of the following is an eye disease ? (1) Measles (2) Bronchitis (3) Glaucoma (4) Diabetes



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9 - 4	19 - 1	29 - 3	39 - 2	49 - 2	59 - 2	69 - 2	
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SET CODE : A BPH-EE-2013 (BIOLOGY)

24/06/2013

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SET CODE : A BPH-EE-2013 (MATHEMATICS)

24/06/2013

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