Doon University, Dehradun
Sample Paper

M.Sc. Environmental Science
M.Sc. Environmental Science with specialization Natural Resource Management

Roll Number					
Programme Name					
Examination Centre					
Date of Examination					
Signatures of Candidate	Name of the Invigilator			Signature of the Invigilator	

Time Allowed: 2 Hours ***Maximum Marks: 100***

INSTRUCTIONS FOR CANDIDATES

Candidates must read carefully the following instructions before attempting the Question Paper.

(i) Write your Roll Number in the space provided above

(ii) There are TWO PARTS in the Paper. **PART I** is compulsory. Answer all the 40 Questions in PART-I.

(iii) In **PART II** select any **Three Sections** out of the **Six Sections** (Botany, Chemistry, Geology, Mathematics, Physics and Zoology) and answer all the **20 Questions** in each of the selected Section.

(iv) Use ONLY BLUE/BLACK Ballpoint Pen to tick the correct option. Do not use Pencil.

(v) Please do not make any stray marks on the Answer Sheet.

(vi) Please do not do any rough work on the Answer Sheet.

(vii) Each question carries 1 mark. There will be no negative marking.

(viii) Pages at the end have been provided for rough work.

(ix) All answers must be tick marked directly on the question paper. Mark your answer **only inside the box** given against the options as follows.

a.	
b	√
c.	
d.	

PART I
ENVIRONMENTAL SCIENCE

Note:

1. Answer all the 40 questions
2. Each Question carries 1 mark

1. Earth's environment is mainly influenced by which forms of solar energy-

a. Light & heat	
b. X-rays &У-rays	
c. UV radiation	
d. Low & high frequency radiations	

2 Which one of the following is a useful biological indicator of Sulphur-dioxide pollution ?

a. Bryophytes	
b. Algal blooms	
c. Pseudomonas	
d. Lichens	

3. Which of the following conceptual spheres of the environment is having the least storage capacity for matter?

a. Atmosphere	
b. Hydrosphere	
c. Lithosphere	
d. Biosphere	

4. The ultimate stable community during succession is called-

a. Pioneer	
b. Climax	
c. Both	
d. None	

5. The darker zone in lakes where light penetration is negligible is called-

a. Littoral	
b. Limnetic	
c. Aphotic	
d. Profoundal	

6. The tropic level I of any food chain is recognized as-

a. Herbivores	
b. Heterotrophs	
c. Carnivores	
d. None	

7. The rate at which radiant energy is stored at producer level is known as-

a. Productivity	
b. Net productivity	
c. Primary productivity	
d. None	

8. The energy transformation of an ecosystem is based on –

a. I law of thermodynamics	
b. II law of thermodynamics	
c. Both	
d. None	

9. In ecological system solar energy is firstly converted into-

a. Heat	
b. Chemical energy	
c. Mechanical energy	
d. All	

10. The nutrient enrichment of lakes are known as –

a. Oligotrophic	
b. Eutrophication	
c. Mesotrophic	
d. None	

11. The concept of ecological pyramid was given by-

a. Anon kerner	
b. Charles Elton	
c. Warming	
d. Mayor	

12. Most plants absorb nitrogen from the soil in the form of –

a. Nitrites	
b. Nitrate	
c. Ammonia	
d. Free nitrogen	

13. Function of ecosystem is-

a. Flow of chemical nutrients	
b. Flow of various gases	
c. Flow of water	
d. None	

14. Who is the current Environment Minister of India

a. Jayanti Natrajan	
b. Jairam Ramesh	
c. Prakash Javrekar	
d. Smriti Irani	

15. Which of those below is NOT a fossil fuel?

a. Natural Gas	
b. Kerosene	
c. Coal	
d. Uranium	

16. In Tehri Garhwal , Chipko Movement was started in-

a. 1973	
b. 1975	
c. 1977	
d. 1979	

17. Which equation is correct for I Law of Thermodynamic –

a. W= E + Q	
b. Q= E + W	
c. E = W +Q	
d. All	

18. Ecesis is a process in which –

a. Seed germination takes place	
b. Increase in the no. Of species	
c. Existing community interacts with the environment	
d. All	

19. Which country was the first to introduce a carbon tax in 1990?

a. Finland	
b. South Korea	
c. Mexico	
d. Norway	

20. Red Data Book giving the list of endangered species of plants and animals is published by –

a. UNESCO	
b. IUCN	
c. WHO	
d. None	

21. Namami Ganga Project is the brainchild of

a. Baba Ramdev	
b. Uma Bharti	
c. Narendra Modi	
d. Mamta Banerjee	

22. Succession is an orderly and progressive replacement of one community by another community. This definition was given by-

a. Hault	
b. Smith	
c. Tansely	
d. Warming	

23.Cryopreservation of plants seed and pollen is done at a very low temperature by using-

a. Ice	
b. Carbon tetrachloride	
c. Liquid nitrogen	
d. Ammonia	

24. When variation occur within a species due to new combination of genes, this is called –

a. Species diversity	
b. Genetic diversity	
c. Ecosystem diversity	
d. None	

25 Which of the following is an example of ex-situ conservation ?

a. Biosphere reserve	
b. National parks	
c. Both	
d. None	

26. After Brazil, which country has the largest rainforest areas on the planet?

a. India	
b. Papua New Guinea	
c. Colombia	
d. Democratic Republic of Congo	

27. Western ghats are very rich in endemic species of –

a. Amphibians	
b. Birds	
c. Reptiles	
d. All	

28. The grasslands in North America are called –

a. Savannas	
b. Pampas	
c. Steppes	
d. Prairies	

29. 'Lion-tailed macaque' is the key faunal species of which Biosphere Reserve?

a. Nilgiri	
b. Dehang-Debang	
c. Dibru-Saikhowa	
d. Nokrek	

30. The largest number of Tiger Reserves are located in :

a. Karnataka	
b. Andhra Pradesh	
c. Madhya Pradesh	
d. West Bengal	

31. In an aquatic ecosystem zooplankton can be considered as a –

a. Consumer	
b. Producer	
c. Saprotrophs	
d. Nutrients	

32. Primary component in Biogeochemical cycle is

a. Human beings	
b. Large animals	
c. Water	
d. Plants and Microbes	

33. Which of the following is not World heritage site ?

a. Manas	
b. Nandadevi	
c. Kaziranga	
d. Periyar	

34. World Wetland day is celebrated on –

a. Feb. 2	
b. Oct. 24	
c. March 22	
d. April 22	

35. Which of the following is a biodiversity hotspot in India ?

a. Gulf of manner	
b. Sunderbans	
c. Panchmarhi	
d. Western ghats	

36. Which of the following is an endemic species of India ?

a. Asian elephant	
b. Panda	
c. Whales	
d. Lion –tailed macaque	

37. Full form of UNDP

a. Unity in national development program	
b. Union nation development planning	
c. United nation development program	
d. United nation development planning	

38. The use of microorganism metabolism to remove pollutants such as oil spills in the water bodies is known as :

a. Biomagnification	
b. Bioremediation	
c. Biomethanation	
d. Bioreduction	

39. Which Ministry gives environmental clearance to developmental projects in India

a. MHRD	
b. MOEF	
c. MNES	
d. Ministry of Commerce	

40. Which of the following missions was launched by NASA last year (2014)?

a. Global Precipitation Measurement (GPM)	
b. Ocean Surface Topography Mission (OSTM)	
c. Tropical Rainfall Measuring Mission (TRMM)	
d. Solar Radiation and Climate Experiment (SORCE)	

PART II

Note:

1. Select any THREE SECTIONS out of the following SIX Sections and answer all the 20 questions in each section.
2. Each question carries one mark

Section A: BOTONY

1. Mayor proposed which type of concept of species.

a.	Static Concept	
b.	Biological Concept	
c.	Typological Concept	
d.	Genetic Concept	

2. Group of organisms that closely resemble each other and freely inbreed in nature, constitute a:

a.	Species	
b.	Genus	
c.	Family	
d.	Taxon	

3. Whittaker is famous for :

a.	Two kingdom classification	
b.	Four kingdom classification	
c.	Five Kingdom classification	
d.	Six kingdom classification	

4. In blue green algae photosynthesis occurs at:

a.	Chromatophore	
b.	Chloroplast	
c.	Photosynthetic lamellae or Thylakoids	
d.	Chromoplast	

5. Infoldings of plasma membrane in bacteria are called as :

a.	Episomes	
b.	Plasmid	
c.	Pilli	
d.	Mesosomes	

6. Which of the following is an exception of monera kingdom:

a.	Bacteria	
b.	Virus	
c.	Cyanobacteria	

7. Nif gene is found in :

a.	Pseudomonas	
b.	Salmonella	
c.	Rhizobium	
d.	Mycobacteria	

8. Dead remains of Diatoms at sea bed are called:

a.	Keiselgurh	
b.	Prostule	
c.	Coral reefs	
d.	None	

9. Plant decompsers are:

a.	Monera and Fungi	
b.	Fungi and Plants	
c.	Protista and Animalia	
d.	Animalia and Monera	

10. Plants reproducing by spores such as mosses and ferns are grouped under the general term:

a.	Cryptogams	
b.	Bryophyta	
c.	Sporophyta	
d.	Thallophytes	

11. The term antibiotic was coined by:

a.	Edward Jenner	
b.	Louis Pasteur	
c.	Salmen Waksman	
d.	Alexander Fleming	

12. The name of Norman Borlaug is associated with :

a.	Green Revolution	
b.	Yellow Revolution	
c.	White Revolution	
d.	Ever Green Revolution	

13. The common nitrogen fixer in paddy fields is:

a. Frankia	
b. Rhizobium	
c. Azospirllum	
d. Oscillatoria	

14. The gene pool consists of :

a. All the alleles exposed to natural selection	
b. The total of all alleles present in a population	
c. The entire genome of a reproducing individual	
d. All the gametes in a population	

15. A fruit is most commonly :

a. A mature ovary	
b. A modified root	
c. A Thickened style	
d. An enlarged ovule	

16. Which of the following is not part of an older tree's bark:

a. Cork	
b. Secondary Xylem	
c. Cork Cambium	
d. Secondary phloem	

17. Which structure or compartment is not part of the plant apoplast?

a. The lumen of a xylem vessel	
b. The lumen of a sieve tube	
c. The cell wall of a mesophyll cell	
d. The cell wall of a transfer cell	

18. Carnivores adaptation of plants mainly compensate for soil that has relatively low content of:

a. Potassium	
b. Nitrogen	
c. Water	
d. Calcium	

19. Which of the following conditions is needed by almost all seeds to break dormancy:

a. Exposure to light	
b. Imbibition	
c. Abrasion of the seed coat	
d. Exposure to cold temperature	

20. Spraying some plants with a combination of auxin and gibberellins :

a. Promotes fruit growth	
b. Kills broadleaf dicot plant	
c. Prevents senescence	
d. Promotes fruit ripening	

Section B: CHEMISTRY

1. 27 g of aluminium will react completely with

a.	8 g of oxygen	
b.	24 g of oxygen	
c.	16 g of oxygen	
d.	48 g of oxygen	

2. Maximum number of electrons in a sub-shell with $l = 3$ and $n = 4$ is

a.	10	
b.	12	
c.	14	
d.	16	

3. The pair of species with the same bond order is

a.	NO, CO	
b.	N_2, O_2	
c.	O_2^{2-}, B_2	
d.	O_2^+, NO^+	

4. In allene (C_3H_4), the type(s) of hybridisation of the carbon atoms is (are)

a.	sp and sp^3	
b.	sp and sp^2	
c.	sp^2 and sp^3	
d.	Only sp^2	

5. In acetylene molecule, between the carbon atoms there are

a.	Three sigma bonds	
b.	Two sigma and one pi bonds	
c.	One sigma and two pi bonds	
d.	Three pi bonds	

6. Which of the following is an intensive property?

a.	Temperature	
b.	Surface tension	
c.	Viscosity	
d.	All of these	

7. Which one of the following is paramagnetic?

a.	N_2	
b.	NO	
c.	CO	
d.	O_3	

8. Which one is not a constituent of nucleic acid?

a.	Uracil	
b.	Guanidine	
c.	Phosphoric acid	
d.	Ribose sugar	

9. +I effect is shown by,

a.	$-N0_2$	
b.	-Cl	
c.	-Br	
d.	$-CH_3$	

10. Which of the following has the highest bond order?

a.	N_2	
b.	O_2	
c.	He_2	
d.	H_2	

11. A ligand can also be regarded as

a.	Lewis acid	
b.	Bronsted base	
c.	Lewis base	
d.	Bronsted acid	

12. What is the IUPAC name for the following compound?

a.	1,3-pentamethylpropane	
b.	1,1,3,3-tetramethylbutane	
c.	2,3,4-trimethylpentane	
d.	2,2,4-trimethylpentane	

13. For the reaction $N_2O_5(g) \rightarrow 2NO_2(g) + 0.5O_2(g)$ the value of rate of disappearance of N_2O_5 is given as 6.25×10^{-3} mol L^{-1} s^{-1}. The rate of formation of NO_2 and O_2 is given respectively as:

a.	6.25×10^{-3} mol L^{-1} s^{-1} and 3.125×10^{-3} mol L^{-1} s^{-1}	
b.	6.25×10^{-3} mol L^{-1} s^{-1} and 6.25×10^{-3} mol L^{-1} s^{-1}	
c.	6.25×10^{-3} mol L^{-1} s^{-1} and 6.25×10^{-3} mol L^{-1} s^{-1}	
d.	1.25×10^{-2} mol L^{-1} s^{-1} and 3.125×10^{-3} mol L^{-1} s^{-1}	

14. In a reaction, $A + B \rightarrow$ Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, rate law for the reaction can be written as

a.	Rate = k[A] [B]	
b.	Rate = $k[A]^2[B]$	
c.	Rate = $k[A][B]^2$	
d.	Rate = $k[A]^2[B]^2$	

15. The role of phosphate in detergent powder is to

a.	Control pH level of the detergent water mixture	
b.	Remove Ca^{2+} and Mg^{2+} ions from the water that causes the hardness of water	
c.	Provide whiteness to the fabrics	
d.	Form solid detergent as phosphate-less detergent are liquid in nature	

16. The extent of adsorption of a gas on a solid depends on _____.

a.	Temperature of the gas	
b.	Pressure of the gas	
c.	Nature of the gas	
d.	All are correct	

17. Alum helps in purifying water by

a.	Coagulating the mud particles	
b.	Sulphate part which combines with dirt and removes it	
c.	Forming Si complex with clay particles	
d.	Making mud water soluble	

18. The general formula of a cycloalkane is

a.	C_nH_{2n+2}	
b.	C_nH_{2n-2}	
c.	C_nH_{2n}	
d.	C_nH_n	

19. Presence of a nitro group in a benzene ring

a.	Activates the ring towards electrophilic substitution	
b.	Renders the ring basic	
c.	Deactivates the ring towards nucleophilic substitution	
d.	Deactivates the ring towards electrophilic substitution	

20. Saturated solution of KNO_3 is used to make 'salt bridge' because

a.	Velocity of K^+ is greater than that of NO_3^-	
b.	Velocity of NO_3^- is greater than that of K^+	
c.	Velocity of both K^+ and NO_3^- are nearly the same	
d.	KNO_3 is highly soluble in water	

Section C: GEOLOGY

1. Approximately how long ago did the Big Bang take place?

a. 10-15 thousand years ago	
b. 10-15 million years ago	
c. 100-150 million years ago	
d. 10-15 billion years ago	

2. What are the two most abundant elements in nebula (gas clouds) in the universe?

a. Nitrogen and Oxygen	
b. Oxygen and Silicon	
c. Hydrogen and Helium	
d. Iron and Nickel	

3. Thickness of the Earth crust is?

a. About 4 Miles	
b. About 4 Km	
c. About 40 Km	
d. About 400 Km	

4. The layer that separates crust from core is the?

a. Magma layer	
b. Lithosphere	
c. Mantle	
d. Continent	

5. _____ involves transfer of heat by the physical movement of the material:

a. Conduction	
b. Convection	
c. Metamorphism	
d. Radiation	

6. According to continental drift theory from which super continent India got separated?

a. Pangea	
b. Laurasia	
c. Panthalassa	
d. Gondwana	

7. Why is our vulnerability to natural disasters growing?

a. Because the frequency of volcanic eruptions is increasing	
b. Because the human population is increasing	
c. Because the number of earthquakes each year is increasing	
d. Because the number of floods each year is increasing	

8. Which element has maximum composition in Earth's crust

a. Oxygen	
b. Iron	
c. Aluminium	
d. Silicon	

9. What drives the Earth's internal heat engine?

a. Radioactivity	
b. Solar energy	
c. Volcanoes	
d. Ocean tides	

10. Minerals:

a. Can form by life-processes of organic matter	
b. Are crystalline solids	
c. Have a unique chemical composition	
d. Can be any state as long as that state occurs naturally	

11. Metamorphic rocks are changed rocks. Which of the following rock types could be the "parent" of a metamorphic rock?

a. Sedimentary	
b. Igneous	
c. Metamorphic	
d. All of the above	

12. The greatest threat to our environment is _____?

a. Volcanoes	
b. Earthquakes	
c. Humans	
d. Bacteria	

13. Which of the following materials has the highest porosity?

a. Clay	
b. Silt	
c. Gravels	
d. Sandstones	

14. The outer planets are composed mostly of:

a. Rocks and ice	
b. Oxygen and nitrogen	
c. Hydrogen and helium	
d. Helium and krypton	

15. Under intense pressure and high temperature, hydrogen atoms combine to form helium. This process is called:

a. Nuclear fusion	
b. Nuclear fission	
c. Metamorphism	
d. Convection	

16. The process by which an originally homogeneous Earth developed a dense core and a light crust is called:

a. Metamorphism	
b. Differentiation	
c. Accretion	
d. Compression	

17. Richter scale is related to:

a. Disaster	
b. Earthquake	
c. Tsunami	
d. Glacier	

18. Outermost part of the Earth crust is called:

a. Asthenosphere	
b. Lithosphere	
c. Stratosphere	
d. Biosphere	

19. Lower layer of Earth's crust is made up of:

a. Magnesium and silicate minerals	
b. Copper and Silica	
c. Nickel and Iron	
d. Magnesium and Aluminium	

20. The breaking down of rocks, soil and minerals through contact with the atmosphere, biota and waters is known as:

a. Weathering	
b. Meandering	
c. Landslide	
d. Depositio	

Section D: MATHEMATICS

1. The maximum value of sin (cos x) is equal to

a.	$sin\ 1$	
b.	1	
c.	$sin\ (\frac{1}{\sqrt{2}})$	
d.	$sin\ (\frac{\sqrt{3}}{2})$	

2. The graph of $y = f(x)$ is symmetrical about the line $x = 1$, then

a.	$f(-x) = f(x)$	
b.	$f(1 + x) = f(1 - x)$	
c.	$f(x + 1) = f(x - 1)$	
d.	none of these	

3. The function $L(x) = \int_1^x \frac{dt}{t}$ satisfies the equation

a.	$L(x+y) = L(x) + L(y)$	
b.	$L\left(\frac{x}{y}\right) = L(x) + L(y)$	
c.	$L(xy) = L(x) + L(y)$	
d.	none of these	

4. Volume of tetrahedron formed by the planes $x + y = 0$, $y + z = 0$, $z + x = 0$, $x + y + z - 1 = 0$ is

a.	a. 1/6	
b.	b. 1/3	
c.	c. 2/3	
d.	d. none of these	

5. The plane $x = 0$ divides the join of (–2, 3, 4) and (1, –2, 3) in the ratio

a.	2:1	
b.	1:2	
c.	3:2	
d.	-4:3	

6. The set of real values of x satisfying $\big||x-1|-1\big| \le 1$ is

a.	[-1,3]	
b.	[0,2]	
c.	[-1,1]	
d.	none of these	

7. If the roots of the equation $\frac{a}{x-a} + \frac{b}{x-b} = 1$ are equal in magnitude and opposite in sign, then

a.	$a - b = 0$	
b.	$a + b = 1$	
c.	$a - b = 1$	
d.	$a + b = 0$	

8. The roots of $ax^2 + 2bx + c = 0$ and $bx^2 - 2\sqrt{ac}x + b = 0$ are simultaneously real, then

a.	$a = b, c = 0$	
b.	$ac = b^2$	
c.	$4b^2 = ac$	
d.	*none of thses*	

9. Let S_n denote the sum to n terms of an arithmetic progression whose first term is a. If the common difference is equal to $S_n - kS_{n-1} + S_{n-2}$, then $k =$

a.	*1*	
b.	*2*	
c.	3	
d.	*none of thses*	

10. For an ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, θ_1 and θ_2 are the eccentric angles of points P and Q respectively. If $|\theta_1| + |\theta_2| = \pi$, then

a.	Point P and Q are in opposite quadrant	
b.	Line PQ is parallel to major axis	
c.	Line PQ always passes through centre of ellipse	
d.	*None of thses*	

11. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is

a.	$y = 2$	
b.	$y = 2x$	
c.	$y = 2x - 4$	
d.	$y = 2x^2 - 4$	

12. The area of the figure bounded by $y^2 = 9x$ and $y = 3x$ is

a.	a. *1*	
b.	b. *1/4*	
c.	c. *1/2*	
d.	d. *2*	

13. $A^2 - A = 0$, where A is a 9×9 matrix. Then

a.	a. A must be a zero matrix	
b.	b. A is an identity matrix	
c.	c. rank of A is 1 or 0	
d.	d. A is diagonalizable	

14. A is a unitary matrix. Then eigen value of A are

a.	*1,-1*	
b.	*1,-i*	
c.	*i,-i*	
d.	*-1,i*	

15. Let u, v, w be three non-zero vectors which are linearly independent, then

a.	u is linear combination of v and w	
b.	v is linear combination of u and w	
c.	w is linear combination of u and v	
d.	None of these	

16. Let U and W be subspaces of a vector space V and U∪W is also a subspace of V, then

a.	Either U⊆W or W⊆U	
b.	U∩W=ϕ	
c.	U=W	
d.	None of these	

17. The reason for using numerical methods is

a.	One cannot always find the exact solution	
b.	The graphics are nice	
c.	One can easily experiment with model parameters	
d.	A modern way of doing engineering	

18. _____ bytes are required to encode 2000 bits of data,

a.	*1*	
b.	*2*	
c.	*3*	
d.	*8*	

19. What is the output of this program?

```
#include <stdio.h>
#include <math.h>
int main ()
{
   printf ("%lf", pow (7.0,3));
   return 0;
}
```

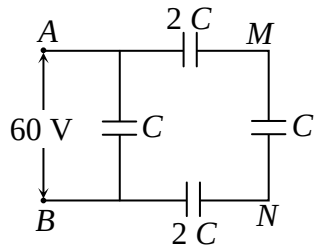
a.	a. *340*	
b.	b. *343.00*	
c.	c. *334*	
d.	*None of these*	

20. The maximum value of sin (cos *x*) is equal to

a.	$sin\ 1$	
b.	1	
c.	$sin\ (\frac{1}{\sqrt{2}})$	
d.	$sin\ (\frac{\sqrt{3}}{2})$	

Section E: PHYSICS

1. In the circuit shown, a potential difference of 60V is applied across *AB*. The potential difference between the points *M* and *N* is



a. 10 V	
b. 15 V	
c. 20 V	
d. 30 V	

2. The energy that should be added to an electron, to reduce its de-Broglie wavelengths from 10^{-10}m to 0.5×10^{-10} m, will be

a. Four times the initial energy	
b. Thrice the initial energy	
c. Equal to the initial energy	
d. Twice the initial energy	

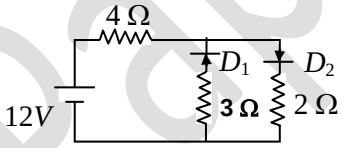
3. The radioactivity of an element becomes $\frac{1}{64}$ th of its original value in 60 seconds. Then the half life period of element is

a. 5 secs	
b. 10 secs	
c. 20 secs	
d. 30 secs	

4. A solid which is transparent to visible light and whose conductivity increases with temperature is formed by

a. Metallic binding	
b. Ionic binding	
c. Covalent binding	
d. Vander Waals binding	

5. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



a. 1.33 A	
b. 1.71 A	
c. 2.00 A	
d. 2.31 A	

6. Two electrons of kinetic energy 2.5 eV fall on a metal plate, which has work function of 4.0 eV. Number of electrons ejected from the metal surface is

a. One	
b. Two	
c. Zero	
d. More than two	

7. The electron emitted in beta radiation originates from

a. Inner orbits of atoms	
b. Free electrons existing in nuclei	
c. Decay of neutron in a nucleus	
d. Photon escaping from the nucleus	

8. The electromagnetic waves that has highest wavelength is

a. X-rays	
b. Ultraviolet rays	
c. Infra-red rays	
d. Microwaves	

9. In a transistor, the emitter-base junction and the collector-base junction are:

a. Forward and forward biased respectively	
b. Reverse and reverse biased respectively	
c. Reverse and forward biased respectively	
d. Forward and reverse biased respectively	

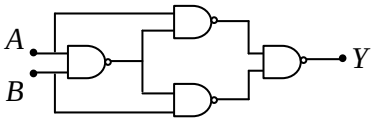
10. A radiation of energy E falls normally on a perfectly absorbing surface. The momentum transferred to the surface is

a. $\frac{E}{c}$	
b. $\frac{2E}{c}$	
c. Ec	
d. $\frac{E}{c^2}$	

11. The current gain of a transistor in common emitter circuit is 40. The ratio of emitter current to base current is

a. 40	
b. 41	
c. 42	
d. 43	

12. Select the outputs Y of the combination of gates shown below for inputs $A = 1$, $B = 0$; $A = 1$, $B = 1$ and $A = 0$, $B = 0$ respectively:



a. (0 0 1)	
b. (1 0 1)	
c. (1 1 1)	
d. (1 0 0)	

13. Identify the correct statement.

a. The entropy of a system always increases when it undergoes an irreversible process	
b. The entropy of a system always decreases when it undergoes an irreversible process	
c. The second law of thermodynamics follows directly from principle of conservation of energy	
d. The internal energy of an ideal gas depends on its temperature	

14. What frequencies of electromagnetic radiation are absorbed by gasses in the troposphere?

a. Infrared	
b. Microwaves	
c. Radio waves	
d. Ultraviolet	

15. Heat required to melt 1 gm of ice is 80 cal. A man melts 60 gms of ice by chewing it in 1 minute. His power is

a. 4800 W	
b. 336 W	
c. 80 W	
d. 0.75 W	

16. Which one of the following statements is incorrect?

a. If positive work is done by a system in a thermodynamic process, its volume must increase.	
b. If heat is added to a system, its temperature must increase.	
c. A body at 20^0C radiates in a room, where room temperature is 30^0C.	
d. If pressure vs temperature graph of an ideal gas is a straight line, then work done by the gas is zero.	

17. Which of the following is the correct statement of the second law of thermodynamics?

a. There is a definite amount of mechanical energy, which can be obtained from a given quantity of heat energy.	
b. It is impossible to construct an engine working on a cyclic process, whose sole purpose is to convert heat energy into work.	
c. It is impossible to transfer heat from a body at a lower temperature to a higher temperature, without the aid of an external source.	
d. all of the above	

18. In an isothermal process

a. There is no change in temperature	
b. There is no change in enthalpy	
c. There is no change in internal energy	
d. All of thses	

19. The terminal velocity of a small sphere settling in a viscous fluid varies as the

a. Inverse square of the diameter.	
b. First power of its dimeter.	
c. Inverse of the fluid viscosity.	
d. Square of the difference in specific weights of solid & fluid.	

20. Bose-Einstein distribution is valid for

a. Electrons	
b. Fermions	
c. Bosons	
d. Protons	

Section F: ZOOLOGY

1. A treeless biome is

a. Tundra	
b. Grasslands	
c. Desert	
d. All of the above	

2. Estuaries Occur in

a. Orissa and Tamil Nadu	
b. Kerala and Tamil Nadu	
c. Kerala and Orissa	
d. Kerala, Tamil Nadu and Orissa	

3. Karyogamy is

a. Delayed mitosis	
b. Delayed meiosis	
c. Fusion of gamete protoplasts	
d. Fusion of gametic nuclei	

4. Which hormone produces calorigenic effect in the body?

a. Adrenaline	
b. FSH	
c. Growth hormone	
d. Thyroxine	

5. Deficiency of the adrenal cortex leads to

a. Cushing disease	
b. Conn's syndrome	
c. Addison's disease	
d. Simmond's disease	

6. *Xenopus* excretes

a. Uric acid	
b. Urea	
c. Ammonia	
d. Creatinine	

7. Which one transfers electrons to ETS?

a. Phytochrome	
b. FeS	
c. Cytochrome	
d. Both b and c	

8. Heparin is formed by

a. Liver cells	
b. Plasma cells	
c. Blood cells	
d. Spleen cells	

9. Blood is

a. Acidic	
b. Alkaline	
c. Neutral	
d. Variable	

10. Number of spiracles in Cockroach is

a. 6 pairs	
b. 8 pairs	
c. 10 pairs	
d. 12 pairs	

11. Point mutation is

a. Loss of gene	
b. Change in a base of gene	
c. Addition of a gene	
d. Deletion of a segment of gene	

12. Linkage was discovered by

a. Punnet	
b. Mendel	
c. Muller	
d. Morgan	

13. The modern cell theory is called

a. Protoplasmic theory	
b. Cell Principle	
c. Cell Doctrine	
d. Both b and c	

14. Tapeworm respires

a. Though suckers	
b. Through mouth	
c. Through lateral pores and sterigmata	
d. Anaerobically	

15. Amoeba is

a. Herbivorous	
b. Carnivorous	
c. Sanguivorous	
d. Omnivorous	

16. Vinegar is fermented from alcohol by

a. Azotobacter	
b. Clostridium	
c. Acetobacter aceti	
d. Bacillus subtilis	

17. Cis-trans expression of genes is an example of

a. Mutation	
b. Intergenic crossing over	
c. Intragenic crossing over	
d. Cytoplasmic inheritance	

18. Cranial capacity of modern man is

a. 450-650 cc	
b. 600-1000 cc	
c. 900-1100 cc	
d. 1200-1600 cc	

19. Secondary producers are

a. Herbivores	
b. Heterotrophs	
c. Carnivores	
d. Green plants	

20. Which is the most recent in human evolution

a. Mesolithic	
b. Upper palaeolithic	
c. Neolithic	
d. Middle palaeolithic	