Doon University, Dehradun

Sample Paper

B.Sc. (Hons.)/M.Sc. Integrated Physics/Mathematics/Chemistry/Computer Science

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 20 Questions in PART-I.

(iii)   In **PART II** select any **Four Sections** out of the **Five Sections** (Biology, Chemistry, Computer Science, Mathematics, Physics) 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 <u>at the end</u> 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
General Awareness

Note:
1. Answer all the 20 questions
2. Each Question carries 1 mark

1. Which city of the world is considered most polluted at present?

a.	Beijing	
b.	Santiago	
c.	Karachi	
d.	Shanghai	

2. Who is the current British Prime Minister?

a.	David Cameron	
b.	Nick Clegg	
c.	John Major	
d.	Ed Milliband	

3. What was Sister Nirmala's real name?

a.	Nirmala Pant	
b.	Nirmala Joshi	
c.	Nirmala Sharma	
d.	Nirmala Paul	

4. Which Tennis Star has been chosen as Brand Ambassador by Kerala government to promote Tourism and Ayurveda?

a.	Sania Mirza	
b.	Staffi Graf	
c.	Maria Sharapova	
d.	Martina Navratilova	

5. In the year 2014 the Flight 370 having 239 passengers on board disappeared. Which country's airlines it was?

a.	Russia	
b.	Ukraine	
c.	Malaysia	
d.	Somalia	

6. The deadly Ebola became epidemic in which part of the world?

a.	Latin America	
b.	South east Asia	
c.	Africa	
d.	Eastern Europe	

7. Who said the famous lines-: " Yoga does not discriminate "

a.	Ban Ki Moon	
b.	Narendra Modi	
c.	Barack Obama	
d.	Hillary Clinton	

8. Who is the current world champion in Football?

a.	Brazil	
b.	Germany	
c.	France	
d.	Spain	

9. World Environment Day is celebrated on

a.	22nd April	
b.	5th June	
c.	16th September	
d.	11th July	

10. Which was the first country to put its spacecraft in the orbit of planet Mars in its very first attempt?

a.	USA	
b.	Russia	
c.	China	
d.	India	

11. The research laboratory where the so called God's particle was observed, is based in

a.	UK	
b.	Italy	
c.	France	
d.	Switzerland	

12. Which country in Europe is facing serious financial crisis?

a.	Greece	
b.	Spain	
c.	Turkey	
d.	Portugal	

13. GST refers to

a.	General service tax	
b.	Goods and service tax	
c.	Goods and service tribunal	
d.	Graded service tax	

14. Who is currently the ICC (international cricket council) president?

a.	N Srinivasan	
b.	Jagmohan Dalima	
c.	Jaheer Abbas	
d.	Mike Brearley	

15. Which terrorist was the mastermind of 26/11 Mumbai attack?

a.	Ibrahim al Asiri	
b.	Hafiz Saeed	
c.	Dawood Ibrahim	
d.	Abu Salem	

16. Which of the following is not an IT company?

a.	CISCO	
b.	Google	
c.	Avaya	
d.	Siemens	

17. Category of notices which can be issued by Interpole does not have

a.	Blue corner notice	
b.	Red corner notice	
c.	Green corner notice	
d.	Brown corner notice	

18. Which Indian Scientist was conferred recently highest civilian award by Japanese Government?

a.	C.N. R Rao	
b.	S. Radhakrishan	
c.	Anil Kakodkar	
d.	K. L. Chopra	

19. Mission 'Indradhanush' aims at

a.	Immunization of all by 2020	
b.	Sanitation for all by 2022	
c.	Clean drinking water for all by 2022	
d.	Higher education for all by 2015	

20. Who won the Oscar award 2015 for best Actress?

a.	Julianne Moore	
b.	Maryl Streep	
c.	Jessica Lange	
d.	Dianne Keaton	

PART II

Note:

1. Select any FOUR SECTIONS out of the following FIVE Sections and answer all the 20 questions in each section.

2. Each question carries one mark

Section A: BIOLOGY

1. Which of the following pairs is mismatched:

a.	Nuclear power-radioactive waste	
b.	Solar energy – greenhouse effect	
c.	Fossil fuel burning-release of CO2	
d.	Biomass burning-release of fossil fuel	

2. Tiger is not a resident in which of the following national park:

a.	Jim Corbett	
b.	Ranthambore	
c.	Sunderbans	
d.	Gir	

3. Photochemical smog pollution does not contain:

a.	Carbon dioxide	
b.	PAN	
c.	Ozone	
d.	Nitrogen dioxide	

4. Which of the following is not included under in-situ conservation?

a.	Biosphere reserve	
b.	National park	
c.	Sanctuary	
d.	Botanical garden	

5. The study of interactions between living organisms and environment is called:

a.	Ecosystem	
b.	Phycology	
c.	Parasitology	
d.	Ecology	

6. Green house effect is mainly due to:

a.	SO2	
b.	Co2	
c.	CO	
d.	O2	

7. Which of the following is main factor of water pollution:

a.	Smoke	
b.	Industrial waste	
c.	Detergent	
d.	Ammonia	

8. The vector for causing sleeping sickness in man is:

a.	House fly	
b.	Mosquito	
c.	Tse-Tse fly	
d.	Butter fly	

9. Sponges belongs to phylum:

a.	Porifera	
b.	Protozoa	
c.	Arthopoda	
d.	Coeloentrata	

10. The scientific name of tapeworm is:

a.	*Taenia*	
b.	*Ascaris*	
c.	*Neries*	
d.	*Fasicola*	

11. The biggest phylum of animal kingdom is:

a.	Arthopoda	
b.	Protozoa	
c.	Mammalia	
d.	Crustacea	

12. Biotic and abiotic components form:

a.	Community	
b.	Society	
c.	Population	
d.	Species	

13. Protein synthesis takes place in:

a.	Ribosomes	
b.	Lysosomes	
c.	Mitochondria	
d.	Chloroplast	

14. Which cell organelle is absent in animal cell

a.	Chloroplast	
b.	Mitochondria	
c.	Ribosomes	
d.	Endolpasmic reticulum	

15. Which nitrogenous base is absent in DNA

a.	Uracil	
b.	Thymine	
c.	Adenosine	
d.	Guanine	

16. During mitosis number of chromosomes get:

a.	Halved	
b.	Doubled	
c.	Remain same	
d.	Tetraploid	

17. The first person to see the cell under the microscope was:

a.	Robert Brown	
b.	Robert Hook	
c.	Mendel	
d.	Darwin	

18. Hill reaction is process of :

a.	Photosynthesis	
b.	Transpiration	
c.	Respiration	
d.	Locomotion	

19. Which phenomenon is also known as necessary evil:

a.	Kreb cycle	
b.	Transcription	
c.	Translation	
d.	Transpiration	

20. Cell wall is mainly composed of:

a.	Cellulose	
b.	Hemicelluloses	
c.	Protein	
d.	Sucrose	

1. In which of the following groups are the three species isoelectric; i.e., have the same number of electrons?

a.	S^{2-}, K^+, Ca^{2+}	
b.	Sc, Ti, V^{2+}	
c.	O^{2-}, S^{2-}, Cl^-	
d.	Mg^{2+}, Ca^{2+}, Sr^{2+}	

2. In which of the following species does sulfur have the same oxidation number as it does in H_2SO_4?

a.	H_2SO_3	
b.	$S_2O_3^{2-}$	
c.	S^{2-}	
d.	SO_2Cl_2	

3. In liquid ammonia, the following reaction occurs:

$$2 NH_3 \rightarrow NH_4^+ + NH_2^-$$

In this reaction NH_4^+ acts as

a.	A catalyst	
b.	Both an acid and a base	
c.	The conjugate acid of NH_3	
d.	The reducing agent	

4. Neutron bombardment of uranium can induce the reaction represented below.

$$^{235}_{92}U + {}^1_0n \rightarrow {}^{141}_{55}Cs + 3\,{}^1_0n + X$$
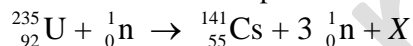
Nuclide X is which of the following?

a.	$^{92}_{35}Br$	
b.	$^{94}_{35}Br$	
c.	$^{91}_{37}Rb$	
d.	$^{92}_{37}Rb$	

5. Of the following compounds, which is the most ionic?

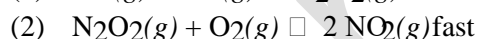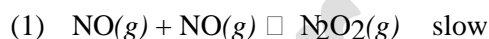| a.	$SiCl_4$	
b.	BrCl	
c.	PCl_3	
d.	$CaCl_2$	

6. A flask contains 0.25 mole of $SO_2(g)$, 0.50 mole of $CH_4(g)$, and 0.50 mole of $O_2(g)$. The total pressure of the gases in the flask is 800 mm Hg. What is the partial pressure of the $SO_2(g)$ in the flask?

a.	800 mm Hg	
b.	600 mm Hg	
c.	250 mm Hg	
d.	160 mm Hg	

7. A possible mechanism for the overall reaction represented as:

$$2 NO(g) + O_2(g) \rightleftharpoons 2 NO_2(g)$$

is the following.

(1) $NO(g) + NO(g) \rightleftharpoons N_2O_2(g)$ slow

(2) $N_2O_2(g) + O_2(g) \rightleftharpoons 2 NO_2(g)$ fast
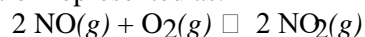
Which of the following rate expressions agrees best with this possible mechanism?

a.	$Rate = k[NO]^2$	
b.	$Rate = k\dfrac{[NO]}{[O_2]}$	
c.	$Rate = k\dfrac{[NO]^2}{[O_2]}$	
d.	$Rate = k[NO]^2[O_2]$	

8. What is the standard enthalpy change, $\Delta H°$, for the reaction represented below?

$$3 C_2H_2(g) \rightleftharpoons C_6H_6(g)$$
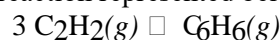
($\Delta H°_f$ of $C_2H_2(g)$ is 230 kJ mol^{-1}; $\Delta H°_f$ of $C_6H_6(g)$ is 83 kJ mol^{-1}.)

a.	−607 kJ (B)	
b.	−147 kJ	
c.	−19 kJ	
d.	+19 kJ	

9. The best explanation for the fact that diamond is extremely hard is that diamond crystals

a.	Are made up of atoms that are intrinsically hard because of their electronic structures	
b.	Consist of positive and negative ions that are strongly attracted to each other	
c.	Are giant molecules in which each atom forms strong covalent bonds with all of its neighboring atoms	
d.	Are formed under extreme conditions of temperature and pressure	

10. According to the VSEPR model, the progressive decrease in the bond angles in the series of molecules CH_4, NH_3, and H_2O is best accounted for by the

a.	increasing strength of the bonds
b.	decreasing size of the central atom
c.	increasing electronegativity of the central atom
d.	increasing number of unshared pairs of electrons

11. Which of the following must be true for a reaction for which the activation energy is the same for both the forward and the reverse reactions?

a.	A catalyst is present.
b.	The reaction order can be obtained directly from the balanced equation.
c.	The reaction order is zero.
d.	ΔH for the reaction is zero.

12. Which of the following is an example of an enamine?

a.	$R_2 C = NR$
b.	$R_2 NH$
c.	$R_2 C = C R–NR_2$
d.	$R_4 N^+$

13. Which of the following oxides is a gas at 25°C and 1 atm?

a.	Rb_2O
b.	N_2O
c.	Na_2O_2
d.	SiO_2

14. Which of the following properties generally decreases across the periodic table from sodium to chlorine?

a.	First ionization energy
b.	Atomic mass
c.	Electronegativity
d.	Atomic radius

15. The effective nuclear charge experienced by the outermost electron of Na is different than the effective nuclear charge experienced by the outermost electron of Ne. This difference best accounts for which of the following?

a.	Na has a greater density at standard conditions than Ne.
b.	Na has a lower first ionization energy than Ne.
c.	Na has a higher melting point than Ne.
d.	Na has a higher neutron-to-proton ratio than Ne.

16. Which of the following is a correct statement about reaction order?

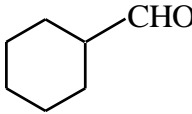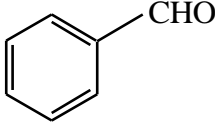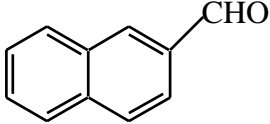|	
a.	Reaction order can only be a whole number.
b.	Reaction order can be determined only from the coefficients of the balanced equation for the reaction.
c.	Reaction order can be determined only by experiment.
d.	Reaction order increases with increasing temperature

17. Sodium chloride is LEAST soluble in which of the following liquids?

a.	H_2O
b.	CCl_4
c.	HF
d.	CH_3OH

18. Which of the following is called an acyl group?

a.	R-COO-
b.	$R–CO–$
c.	$R–CO–O–CO–$
d.	C = O

19. Which of the following used as a suffix of carbaldehyde in naming?

a.	CHO
b.	CHO
c.	CHO
d.	all of these

(20) When two molecules of acetaldehyde combine to yield the hydroxyaldehyde, the product is known as:

a.	Ester
b.	Ether
c.	Aldol
d.	Enol

Section C: COMPUTER SCIENCE

1. Which of the following computer implemented binary numbers, perform calculations using electronics and implemented separate computation and memory for the first time?

a.	Mark I	
b.	ABC	
c.	Z3	
d.	None of above	

2. FORTRAN is a programming language. What does FORTRAN stand for?

a.	File Translation	
b.	Format Translation	
c.	Formula Translation	
d.	Floppy Translation	

3. Which of the following memories needs refreshing?

a.	SRAM	
b.	DRAM	
c.	ROM	
d.	All of above	

4. Can you tell what passes into and out from the computer via its ports?

a.	Data	
b.	Bytes	
c.	Graphics	
d.	Pictures	

5. An output device that uses words or messages recorded on a magnetic medium to produce audio response is

a.	Magnetic tape Voice response unit	
b.	Voice recognition unit Voice band	
c.	Magnetic tape Voice response unit	
d.	Voice recognition unit Voice band	

06. Which of the items below are considered removable storage media?

a.	Removable hard disk cartridges	
b.	(Magneto-optical) disk	
c.	Flexible disks cartridges	
d.	All of the above	

07. Which of the following is not purely output device?

a.	Screen	
b.	Printer	
c.	Speaker	
d.	Plotter	

08. Who developed a mechanical device in the 17th century that could add, subtract, multiple, divide and find square roots?

a.	Napier	
b.	Babbage	
c.	Pascal	
d.	Leibniz	

09. The first Macintosh computer was from

a.	First generation	
b.	Second generation	
c.	Third generation	
d.	Fourth generation	

10. Which of the following is not a form of data?

a.	Numbers and characters	
b.	Images	
c.	Sound	
d.	None of above	

11. Which is not a computer classification?

a.	Mainframe	
b.	Maxframe	
c.	Mini	
d.	Notebook	

12. The control unit of a microprocessor

a.	Stores data in the memory	
b.	Accepts input data from keyboard	
c.	Performs arithmetic/logic function	
d.	None of above	

13. Which of the following is internal memory?

a.	Disks	
b.	Pen Drives	
c.	RAM	
d.	CDs	

14. Which operation is not performed by computer

a.	Inputting	
b.	Processing	
c.	Controlling	
d.	Understanding	

15. Floppy disks which are made from flexible plastic material are also called?

a.	Hard disks	
b.	High-density disks	
c.	Diskettes	
d.	Templates	

16. The magnetic storage chip used to provide non-volatile direct access storage of data and that have no moving parts are known as

a.	Magnetic core memory	
b.	Magnetic tape memory	
c.	Magnetic disk memory	
d.	Magnetic bubble memory	

17. A collection of related instructions organized for a common purpose is referred to as

a.	File	
b.	Database	
c.	Program	
d.	None of above	

18. Plotter accuracy is measured in terms of repeatability and

a.	Buffer size	
b.	Resolution	
c.	Vertical dimensions	
d.	Intelligence	

19. Computer instructions written with the use of English words instead of binary machine code is called

a.	Mnemonics	
b.	Symbolic code	
c.	Gray codes Opcode	
d.	Mnemonics	

20. Which language is directly understood by the computer without translation program?

a.	Machine language	
b.	Assembly language	
c.	High level language	
d.	None of above	

Section D: MATHEMATICS

1. If $\log_4(x) = 12$, then $\log_2(x/4)$ is equal to

a. 11	
b. 48	
c. -12	
d. 22	

2. f is a quadratic function whose graph is a parabola opening upward and has a vertex on the x-axis. The graph of the new function g defined by $g(x) = 2 - f(x-5)$ has a range defined by the interval

a. $[-5, +\infty)$	
b. $[2, +\infty)$	
c. $(-\infty, 2]$	
d. $(-\infty, 0]$	

3. Which of the following is a subset of $\{b, c, d\}$?

a. $\{\ \}$	
b. $\{a\}$	
c. $\{1,2,3\}$	
d. $\{a,b,c\}$	

4. The equation of the x-axis is

a. $y = x$	
b. $y = 0$	
c. $x = 0$	
d. $y = 1$	

5. If $-2 < -\frac{x}{2} < 4$, then

a. $4 > x < -8$	
b. $4 < x > -8$	
c. $4 < x < -8$	
d. $4 > x > -8$	

6. Given that a and b are integers, which of the following is not necessarily an integer?

a. $2a - 5b$	
b. a^7	
c. b^a	
d. ab	

7. Which of the following is NOT a prime number?

a. 11	
b. 21	
c. 31	
d. 41	

8. $2x^2 - 15x + 25 =$

a. $(x-5)(2x-5)$	
b. $(x-5)(2x+5)$	
c. $(x+5)(2x-5)$	
d. $(2x-15)(x+5)$	

9. What is the value of u in the sequence $2, 7, 14, 23, 34, u$?

a. 45	
b. 46	
c. 47	
d. 53	

10. If $3(4 - x) \leq 4x + 5$, then

a. $x \leq 1$	
b. $x \geq 1$	
c. $x \geq 6$	
d. $x \leq 6$	

11. The equation of the line which passes through the point $(0, -3)$ and has a gradient of $1/2$ is

a. $y = \frac{1}{2}x - 3$	
b. $y = -\frac{1}{2}x - 3$	
c. $y = \frac{1}{2}x + 3$	
d. $y = -\frac{1}{2}x + 3$	

12. If α is cube root of unity, then for $n \in N$, the value of $\alpha^{3n+1} + \beta^{3n+5}$ is

a. -1	
b. 0	
c. 1	
d. 3	

13. If $y = f(x)$ and $\log(x+y) - 2xy = 0$, then the value of $y'(0)$ is equal to:

a. 1	
b. -1	
c. 2	
d. 0	

14. If $y = \sin(x^3)$, what is dy/dx?

a. $3x^2\cos(x^3)$	
b. $-3x^2\cos(x^3)$	
c. $x^2(\cos(3^2))$	
d. $\cos(x^3)$	

15. $\int_0^1 (1 + e^{-x})dx =$

a. 1	
b. -1	
c. $1/e$	
d. $-1/e$	

16. $\int \frac{1}{1+\tan^2 x} dx =$

a. $1 - cos2x$	
b. $1 + cos2x$	
c. $(1 + cos2x)/2$	
d. $(1 - cos2x)/2$	

17. Area bounded by the curve $y = x^2$ and the straight line $y = x$ is

a. 1	
b. 1/3	
c. 1/6	
d. 1/2	

18. $\lim_{n->\infty} \frac{x-1}{x+1} =$

a. 0	
b. 1	
c. -1	
d. ∞	

19. Which of the following is the equation of a parabola?

a. $x^2 + y^2 = 4$	
b. $y = 4x^2$	
c. $\frac{x^2}{2} + \frac{y^2}{3} = 1$	
d. $\frac{x^2}{2} - \frac{y^2}{3} = 1$	

20. The probability of an event cannot be

a. 1	
b. 0.3	
c. 0.5	
d. -0.5	

Section E: PHYSICS

1. It is easier to roll a stone up a sloping road than to lift it vertical upwards because

a. Work done in rolling is more than in lifting	
b. Work done in lifting the stone is equal to rolling it	
c. Work done in both is same but the rate of doing work is less in rolling	
d. Work done in rolling a stone is less than in lifting it	

2. The absorption of ink by blotting paper involves

a. Viscosity of ink	
b. Capillary action phenomenon	
c. Diffusion of ink through the blotting	
d. Siphon action	

3. Large transformers, when used for some time, become very hot and are cooled by circulating oil. The heating of the transformer is due to

a. The heating effect of current alone	
b. Hysteresis loss alone	
c. Both the heating effect of current and hysteresis loss	
d. Intense sunlight at noon	

4. Light year is a unit of

a. Time	
b. Distance	
c. Light	
d. Intensity of light	

5. Mirage is due to

a. Unequal heating of different parts of the atmosphere	
b. Magnetic disturbances in the atmosphere	
c. Depletion of ozone layer in the atmosphere	
d. Equal heating of different parts of the atmosphere	

6. Light from the Sun reaches us in nearly

a. 2 minutes	
b. 4 minutes	
c. 8 minutes	
d. 16 minutes	

7. Stars appears to move from east to west because

a. All stars move from east to west	
b. The earth rotates from west to east	
c. The earth rotates from east to west	
d. The background of the stars moves from west to east	

8. Pa(Pascal) is the unit for

a.Tthrust	
b. Pressure	
c. Frequency	
d. Conductivity	

9. Metals are good conductors of electricity because

a. They contain free electrons	
b. The atoms are lightly packed	
c. They have high melting point	
d. All of the above	

10. If two bodies of different masses, initially at rest, are acted upon by the same force for the same time, then the both bodies acquire the same

a. Velocity	
b. Momentum	
c. Acceleration	
d. Kinetic energy	

11. Rectifiers are used to convert

a. Direct current to Alternating current	
b. Alternating current to Direct current	
c. High voltage to low voltage	
d. Low voltage to high voltage	

12. Sound waves in air are

a. Transverse	
b. Longitudinal	
c. Electromagnetic	
d. Polarised	

13. Magnetism at the center of a bar magnet is

a. Minimum	
b. Maximum	
c. Zero	
d. Minimum or maximum	

14. Point A is at a lower electrical potential than point B. An electron between them on the line joining them will

a. Move towards A	
b. Move towards B	
c. Move at right angles to the line joining A and B	
d. Remain at rest	

15. It takes much longer to cook food in the hills than in the plains, because

a. In the hills the atmospheric pressure is lower than that in the plains and therefore water boils at a temperature lower than 100°C causing an increase in cooking time.	
b. Due to low atmospheric pressure on the hills, the water boils at a temperature higher than 100°C and therefore water takes longer to boil	
c. In the hills the atmospheric density is low and therefore a lot of heat is lost to the atmosphere	
d. In the hills the humidity is high and therefore a lot of heat is absorbed by the atmosphere leaving very little heat for cooking	

16. One nanometer is equal to

a. 10^{-6} m	
b. 10^{-8} m	
c. 10^{-9} m	
d. 10^{-5} m	

17. Photoelectric effect supports quantum nature of light because :

    1. There is minimum frequency of light below which no photoelectrons are emitted.

  2. The maximum kinetic energy of photoelectrons depends only on the frequency of light and not on its intensity.

    3. Even when the metal surface is faintly illuminated the photoeclectrons might leave the surface immediately

    4. There is no time lag between incidence of light and emission of photoelectrons.

a. (1)	
b. (1) and (2)	
c. (2) and (3)	
d. (1), (2), (3) and (4)	

18. Which of the following is **NOT** true?

a. Nuclear force is strongest in nature	
b. The net nuclear force on a nucleon well inside nucleus is zero	
c. The nuclear force between two neutrons is the same as that between two protons.	
d. For any separation, the nuclear force between two protons is greater than the electrostatic force between them.	

19. An accelerated frame of reference is called :

a. inertial frame of reference	
b. Non inertial frame of reference	
c. Both of these	
d. None of these	

20. The famous special theory of relativity is proposed by:

a. Maxwell	
b. Coulomb	
c. Einstein	
d. None of these	