



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

Re-sit EXAMINATION PAPER JANUARY 2019

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| TITLE OF PAPER | : | PHYSICS FOR HEALTH SCIENCES (NURSING AND ENVIRONMENTAL HEALTH STUDENTS) |
| COURSE CODE | : | EHS103 |
| DURATION | : | 2 HOURS |
| MARKS | : | 100 |
| INSTRUCTIONS | : | READ THE QUESTIONS & INSTRUCTIONS CAREFULLY |
| | : | ANSWER <u>ANY FOUR</u> QUESTIONS |
| | : | EACH QUESTION <u>CARRIES 25</u> MARKS. |
| | : | WRITE NEATLY & CLEARLY |
| | : | CALCULATOR, GRAPH PAPERS, RULAR AND A SET OF MATHEMATICAL INSTRUMENTS ARE REQUIRED FOR THIS EXAM PAPER |
| | : | EXECPT THE GRAPH PAPER, NO OTHER PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM. |
| | : | STUDENTS ARE ALLOWED TO USE GRAPH PAPERS AND SCIENTIFIC CALCULATORS |
| | : | BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER. |

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION ONE

A car moves from rest with a uniform acceleration of 2 m/s^2 for the first 30 s from O to A. It continues at a constant velocity for the next 40 s from A to B and finally takes 15 s to decelerate uniformly to rest at C.

- a. Calculate the constant speed reached after 30 s. 4 marks.
- b. Sketch a velocity-time graph for the whole journey. 5 marks.
- c. From the graph find the total distance covered. 11 marks.
- d. Calculate the average speed of the car for the whole journey. 5 marks.

Total 25 marks

QUESTION TWO

1. A horizontal unbalanced force of 40 N is applied to a mass of 100 kg at rest on a smooth horizontal surface. How long does it take for the mass to reach a velocity of 40 m/s. 8 marks.
2. A cage of mass 200 kg is held by a cable. Find the tension in the cable when the cage is
 - a. Held at rest. 4 marks.
 - b. Lowered with a constant speed of 2 m/s. 2 marks.
 - c. Raised with constant acceleration of 2 m/s^2 . 8 marks.
 - d. State Newton's law of gravitation. 3 marks.

Total 25 marks

QUESTION THREE

1. A mass of 2 kg is 0.6 m above a table top that is 80 cm above the floor. What is the potential energy of the mass relative to
 - a. The top of the table 6 marks.
 - b. The floor? 6 marks.
2. Answer the following questions.
 - a. State the law of conservation of energy. 2 marks.
 - b. A water fall is delivering 800 kg of water per second from a height of 10 m to a small hydroelectric generating station. How much potential energy is available per second to rotate the water turbines? 5 marks.
 - c. From (b) above, what is the maximum output of electrical power if the efficiency is 75%? 6 marks.

Total 25 marks

QUESTION FOUR

1. State Archimedes' principle. 2 marks.
2. State the law of flotation. 2 marks.
3. A balloon of negligible weight and capacity 100 m^3 is filled with (a) helium of density 0.18 kg/m^3 and then with (b) hydrogen of density 0.09 kg/m^3 . The density of air is 1.2 kg/m^3 . Calculate the lifting powers of the two balloons. 11 marks.
4. Calculate the volume at S.T.P. of a gas whose volume is 100 cm^3 at
 - a. -5°C and 746 mmHg . 5 marks
 - b. Calculate the volume of the same gas at 4°C and 771 mmHg . 5 marks.

Total 25 marks

QUESTION FIVE

1. List any five properties of x-rays 5 marks.
2. Account for the use of X-rays in medicine. 10 marks.
3. Draw a prism and a screen and show how a ray of light is dispersed into its different spectra; indicating the different colours on the screen. 10 marks

Total 25 marks

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|-----------------------|------------------------|-----------------------|--------------------|----------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|---------------------|-----------------------|---------------------|----------------------|---------------------|----------------------|
| 1 H 1.00794 | 4 Be 9.012182 | 21 Sc 44.955910 | 22 Ti 47.867 | 23 V 50.9415 | 24 Cr 51.9961 | 25 Mn 54.938049 | 26 Fe 55.845 | 27 Co 58.933200 | 28 Ni 58.6534 | 29 Cu 63.545 | 30 Zn 65.39 | 31 Ga 69.723 | 32 Ge 72.61 | 33 As 74.92160 | 34 Se 78.96 | 35 Br 79.504 | 36 Kr 83.80 | 2 He 4.002602 |
| 3 Li 6.941 | 12 Mg 24.3050 | 39 Y 88.90585 | 40 Zr 91.224 | 41 Nb 92.90638 | 42 Mo 95.94 | 43 Tc (98) | 44 Ru 101.07 | 45 Rh 102.90550 | 46 Pd 106.42 | 47 Ag 196.56655 | 48 Cd 112.411 | 49 In 114.818 | 50 Sn 118.710 | 51 Sb 121.760 | 52 Te 127.60 | 53 I 126.90447 | 54 Xe 131.29 | 10 Ne 20.1797 |
| 11 Na 22.989770 | 19 K 39.0983 | 57 La 138.9055 | 72 Hf 178.49 | 73 Ta 180.9479 | 74 W 183.84 | 75 Re 186.207 | 76 Os 190.23 | 77 Ir 192.217 | 78 Pt 195.078 | 79 Au 196.56655 | 80 Hg 200.59 | 81 Tl 204.3833 | 82 Pb 207.2 | 83 Bi 208.58038 | 84 Po (209) | 85 At (210) | 86 Rn (222) | 9 F 18.9984032 |
| 19 K 39.0983 | 20 Ca 40.078 | 89 Ac (227) | 104 Rf (261) | 105 Db (262) | 106 Sg (263) | 107 Bh (262) | 108 Hs (265) | 109 Mt (266) | 110 (269) | 111 (272) | 112 (277) | 114 (287) | 114 (289) | 116 (289) | 116 (289) | 116 (289) | 118 (293) | 7 N 14.00674 |
| 37 Rb 85.4678 | 38 Sr 87.62 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 | 137.90545 |
| 87 Fr (223) | 88 Ra (226) | 104 Rf (261) | 105 Db (262) | 106 Sg (263) | 107 Bh (262) | 108 Hs (265) | 109 Mt (266) | 110 (269) | 111 (272) | 112 (277) | 114 (287) | 114 (289) | 116 (289) | 116 (289) | 116 (289) | 118 (293) | 118 (293) | 15 P 30.973761 |
| 58 Ce 140.116 | 59 Pr 140.50765 | 60 Nd 144.24 | 61 Pm (145) | 62 Sm 150.36 | 63 Eu 151.964 | 64 Gd 157.25 | 65 Tb 158.92534 | 66 Dy 162.50 | 67 Ho 164.93032 | 68 Er 167.26 | 69 Tm 168.93421 | 70 Yb 173.04 | 71 Lu 174.967 | 71 Lu 174.967 | 71 Lu 174.967 | 71 Lu 174.967 | 71 Lu 174.967 | 16 S 32.066 |
| 90 Th 232.0381 | 91 Pa 231.036888 | 92 U 238.0289 | 93 Np (237) | 94 Pu (244) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (251) | 99 Es (252) | 100 Fm (257) | 101 Md (258) | 102 No (259) | 103 Lr (262) | 103 Lr (262) | 103 Lr (262) | 103 Lr (262) | 103 Lr (262) | 17 Cl 35.4527 |

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