Registration No : | | | | | | | | | | |

Total Number of Pages : 01 **M.Sc.**

16MCYF409

4th Semester Back Examination 2018-19
NUCLEAR CHEMISTRY
BRANCH : M.Sc.(AC)
Time: 3 Hour
Max Marks : 70
Q.CODE : F404

Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Determine the mean binding energy of ^{16}O, given mass of ^{1}H = 1.0078u, n = 1.0087 u, and ^{16}O = 15.9949u.
b) Explain why neutron has large negative magnetic moment?
c) Predict the name of stable nuclide having mass number 64.
d) Which nuclide (Pb_{82}) is least favourable for radioactive decay? Why?
^{210}Pb; ^{212}Pb and ^{214}Pb
e) How the nuclear radii are described?
f) Write the nucleon configurations of ^{40}K. Determine its spin and parity.
g) Calculate the kinetic energy of an electron whose de Broglie wavelength is 6.626×10^{-10} m.
h) What is nucleon hybridization? Give two examples of it.
i) Describe the functioning of a Ceric Sulphate dosimeter.
j) Write the different units used for radiation energy.

Q2 **a)** Describe the salient features of liquid drop model for the nucleus. **(6)**
b) Write the names and properties of stable particles appear only in some nuclear reactions. **(4)**

Q3 **a)** Describe the theory of α-decay from the nuclei. **(6)**
b) Derive the relationship between a parent and daughter nuclei having same half-life period. **(4)**

Q4 **a)** Write the sequence of filling of nucleons in nuclear potential well and describe the filling of nucleons based on spin-orbit coupling model. **(6)**
b) Write the use of radioactive isotopes in medical applications. **(4)**

Q5 **a)** Discuss the Fermi's four factor formula for functioning of nuclear reactors. **(6)**
b) Describe the methods adopted for handling of nuclear wastes in nuclear reactors. **(4)**

Q6 **a)** Why some nuclei undergo fission? Describe the theory of it. **(7)**
b) Write any two types of special nuclear reactions. **(3)**

Q7 **a)** Describe the theory of neutron activation analysis. **(5)**
b) Write the various types of photonuclear reactions with their special features. **(5)**

Q8 **a)** Describe the applications of radioisotope tracers in elucidating the reaction mechanisms. **(5)**
b) One gram of ^{226}Ra emits 11.6×10^{17} atoms of radium per year. Calculate the value of Avogadro's number if its half-life is 1600 year. **(5)**