AC-3105

Second Year B. Sc. (Sem. IV) Examination

April / May – 2015

Mathematical Modelling - II

(Elective Generic) (New Course)

Time : **2** Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.

Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **SECOND YEAR B. SC. (SEM. IV)**

Name of the Subject :

☛ **MATHEMATICAL MODELLING - II (NEW)**

☛ Subject Code No. : 3 1 0 5 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Digits to the right of each question indicate its marks.

(4) Follow usual symbols

(5) Use of scientific calculator is permissible.

Q-1Answer the following questions (Any Two): [05]

(1) Write only mathematical model for decay of radio active substances .

(2) How long does it take for a given amount of money to get double at 12% per annum compounded Annually?

(3) In the change of price of commodity model , if d>s then the price of commodity increases or decreases?

Q-2 (a) Derive mathematical model for radio active decay and solve it. [08]

OR

(a) Derive mathematical model for Effect of immigration and Emigration on population size and solve it. [08]

(b) If Rs. 10,000 is invested at 6% per annum .Find what amount has been deposited after six years ,if the rate of interest is compounded quarterly and continuously ? [07]

OR

(b) In an archeological wooden specimen, only 50% of original radio carbon-12 is present . When was it made? [07]

Q-3 (a) Derive mathematical model for Newtons law of cooling and solve it . [08]

OR

(a) Derive mathematical model for Fick's law of difussion and solve it . [08]

(b) The concentration of potassium in kidney bis 0.0025 mg/cm^3.The kidney is placed in a large Vessel. In which potassium concentration is 0.1140 mg/ cm^3. In 1 hour the concentration of kidney increases to 0.0027 mg/cm^3. After how much time will the concentration be 0.0035 mg/cm^3? [07]

OR

(c) A body where temperature t is initially 400°C is placed in a large block of ice, its temperature at the end of 7 and 8 miniutes. [07]

Q-4 (a) Derive mathematical model for succesptible –Infected persons. [08]

OR

(a) mathematical model for succesptible –Infected-sisccesptible persons. [08]

(b) Integrate $\frac{dI}{dt} = BI\ (N + 1 - I); when\ t = 0, I(0) = 1\ then\ prove\ that\ I(t) = \frac{(n+1)e^{(n+1)\beta t}}{n+e^{(n+1)\beta t}}$. [07]

OR

(b) Integrate $\frac{ds}{dt} = -\beta s(n + 1 - s); when\ t = 0, s(0) = n\ then\ prove\ that\ \ s(t) = \frac{n(n+1)}{n+e^{(n+1)\beta t}}$ [07]