MTH401_Current Subjective paper
Solved by MASOOM FAIRY

Total Questions: 26

MCQs: 20

Subjective: 6

Q: 21: Show that the functions $f_1(x)=\sin x$ and $f_2(x)=x$ are linearly dependent. [Marks 2]

Answer: **They both are linearly dependent because both are equal to non-zero.**

Q: 22: If $y=e^{mx}$ is the solution of $d^2y/dx^2+dy/dx+2y=0$ then write the auxiliary equation. [Marks 2]

Solution: [according to Complimentary function]

$$m^2+m+2=0$$

Q: 23: Explain the first order Chemical Reaction. [Marks 3]

Answer: [Page 100 and 101]

Chemical reactions:

In a first order chemical reaction, the molecules of a substance A decompose into smaller molecules. This decomposition takes place at a rate proportional to the amount of the first substance that has not undergone conversion. The disintegration of a radioactive substance is an example of the first order reaction. If X is the remaining amount of the substance A at any time t then

$$\frac{dX}{dt}=k\,X$$

$k<0$ because X is decreasing.

In a 2nd order reaction two chemicals A and B react to form another chemical C at a rate proportional to the product of the remaining concentrations of the two chemicals.

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If X denotes the amount of the chemical C that has formed at time t. Then the instantaneous amounts of the first two chemicals A and B not converted to the chemical C are $\alpha - X$ and $\beta - X$, respectively. Hence the rate of formation of chemical C is given by

$$\frac{dX}{dt} = k(\alpha - X)(\beta - X)$$

where k is constant of proportionality.

Q: 24: If $m^2+8m+16=0$ is an equation then find its general solution.

Solution: [According to Complementary Function]

$$m^2+2m+1=0$$
$$(m-1)(m-1)=0$$
$$m_1=1, m_2=1$$
Then,
$$c_1e^{-4x}+c_2e^{-4x}$$

Q: 25: Solution of

$$y''-2y'+y=0$$
$$y=c_1e^x+c_2xe^x \text{ is correct?}$$

Answer: according to Complementary Function

$$m^2+2m+1=0$$
$$(m-1)(m-1)=0$$
$$m_1=1, m_2=1$$

Q: 26: Lecture 20 Like **(Write the wronskian solution of the following.)**