

- Differential equations I

- **Definition, type order of a differential equations, the elimination of arbitrary constants.**
- **Differential equations of order one , methods of finding a solution separation of variables.**
- **Homogeneous equations**
- **Coefficients linear in the two variables**
- **Exact equation**
- **Non-exact converted to exact by determination of integrating factor**
- **Linear equation**
- **Bernoulli equation**
- **Linear differential equation with constant coefficient**
- **Linear independence , the Wronskian**
- **Differential operator, the fundamental laws of operation**
- **The auxiliary equation:- Distinct roots, repeated roots, imaginary roots.**
- **Construction of a homogeneous equation from a specified solution.**

- Differential equations II

- **Non – homogeneous differential equations Solution by method of undeterminer coefficients**
 - **Solution by inspection method, Second order differential equations, Solution by reduction of order, Solution by variation of parameters, Inverse differential operators, The exponential shift method, the operator $1/f(1)$, Evaluation of $1/f(!)eax$, $1/D^2+a^2 \sin bx$, $1/D^2+a^2 \cos bx$**
 - **Solution of differential equations by using inverse differential operators, Laplaces transform and inverse transforms, Definitions, transforms of elementary functions, transform.**
- Fourier series**
- **Orthogonality of a set of sines and consines**
- Fourier sinse series.**
- Fourier cosinse series.**

[الكتب الأساسية:](#)

Elementary Differential Equations, by E. D. Rainville and P. E. Bendient

[المرجع المساند:](#)

طرق في الرياضيات التطبيقية, تأليف د. باسل يعقوب يوسف