Calculus– James Stewart - 8th edition

**Syllabus for Mid term exam** – Function, domain and range, Limit, Continuity, Differentiation, Application of differentiation, Taylor and Maclaurin series, Analysis of function, Indeterminate forms and L’Hopital rule.

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| **Topics** | **Sub topics and Example** | **Exercise** | **Number of Lectures** | **Quiz** |
| **Function, domain and range** | **Function** (P-10)- Definition, Domain, Range (P-12) Example- 2, 6,8 |  | 2 |  |
|  | **Sketch** the graph –  Domain, range  Power function, Straight lines (P-29)  Exponential, logarithmic function (P-32), Trigonometric function  sin x, cos x, tan x (P-31), Absolute value function  |x| (P-16 #8)  Heaviside function  (P-45 # 59)  Step function (P-13)  (P-17 #10) | Domain -P-21 # 31-34, P-70 #5, 7 |  |  |
| **Limit** | Definition- P-83, Limit laws (P-95), Power Law (P-96), P-191 (2)  Example- P-99 # 6 | P-102 # 11, 17, 21, 22  P-138 #15 ,24, 27, 28 | 2 |  |
| Two-Sided limit (P-109)  P-100 Ex-# 7,8,9  Heaviside function- P-87 #6  Greatest integer function/ Floor function-P-101 # 10 |  |  |  |
| **Continuity** | Definition-P-114  Floor function P-116 # 3 | (**continuity only**) P-182 #71, p-125 # 39, 40, 41, 42 , P-283 # 27, 28 |  | Quiz1 |
| **Derivatives** | Definition (P-144, 152) |  | 2 |  |
| Table of Differentiation formula- P-187, 193,  214 ( sin-1x, cos-1x, tan-1x), 218, 261 |  |  |  |
| Product rule, quotient rule (P-187) | P-188 # 3-8,  P-196 # 2, 3, 13 |  |  |
| Chain rule- P-198  Example P-199 # 1,2,3,7,8 | P-204 # 11, 12, 14 |  |  |
| Implicit Differentiation  Example P-208 # 1(a) | P-215 # 2, 3, 5 |  |  |
| Parametric differentiation P-649 | P-655 (**only dy/dx**)  # 11-16 |  |  |
| Logarithmic Differentiation P-220 Example # 7, 8 | P-223 # 39, 41, 43, 44, 48 |  |  |
| Derivative of inverse Trigonometric function P-213 #5 | P-213 sin-1x, cos-1x,  tan-1x, sec-1x |  |  |
| **Application of Differentiation** | Equations of Tangent and Normal P-209  Example #1(b), 2(b) | (**only equation of tangent and normal**)  P-180 # 33, 34, 35  P-215 # 27, 28  P-267 # 61  P-655 # 3-6, 9, 10 | 2 | Quiz2 |
|  | Taylor and Maclaurin series P-760 # 1, 3, 4, 5 (first three nonzero terms) | P-771 # 5, 6, 8, 9, 11, 14, 16 |  |  |
| **Analysis of function** | Stationary points P-280 | P-301 # 9, 10, 11, 13, 17  P-302 # 37-40 | 2 |  |
| Increasing, decreasing function P-293 # 1, 3 |  |  |
| Concave up, down P-296  Inflection point P-297 |  |  |
| Local maximum, minimum, second derivative test -P-297 |  |  |
| Sketch a graph of a function |  |  |
| **Optimization Problem** | P-331 # 1, 2, 5 | P-337 # 14-16 |  | Quiz3 |
| **Indeterminate forms and L’Hopital rule** | Indeterminate form of type  P-306 # 1-4  # 6,  #7,  #9,10 | P-311 # 13, 15, 19, 43, 47, 51, 53, 57, 63, 65 | 2 |  |

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**Syllabus for Final exam** - Coordinate Geometry: Circles, Conic Sections: Parabola, Ellipse, Hyperbola, Shifted conics, Rotation of Axes, Polar coordinates, Three-dimensional coordinate systems: Vector Analysis, Equations of lines and planes, Function of severable variables: Partial derivatives, maximum and minimum values of function.

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| **Topics** | | **Sub topics and Example** | **Exercise** | | **Number of Lectures** | **Quiz** |
| **Coordinate Geometry of Two Dimensions** | | **Circle** (A16) Equation of a circle. Example # 1, 2 | P-A23 #1-4, # 5-9 | | 3 |  |
|  | | **Conic Sections**  Parabolas (P-674) # 1  Ellipses (P-676) # 2, 3  Hyperbolas(P-677) # 4, 5  Shifted Conics (P-679) # 7  Rotation of axes (lecture notes will be provided)  Polar coordinates(P-658) #1 | Identify, sketch and locate foci, vertices.  P-A23 Ex # 11-22, 24-32  P-666 #3-6 | |
| **Three-dimensional Coordinate Geometry** | | **Vectors (P-798)**  Definition, terminal point, initial point, vector addition, triangle law, parallelogram law, scalar multiplication, Magnitude (P-801)  Dot product(P-807) # 1, Angle between two vectors(P-809) # 3, Perpendicular/ orthogonal vectors (P-809) # 4, Direction angle, Direction Cosine (P-810) # 5, Projection (P-811) # 6, Work done (P-812) # 7,8 | P-812-813  (a)Dot product # 4,8  (b)Angle # 17-20  (c)Vectors orthogonal, parallel # 23(b,c,d), 24  (d)Direction cosine, Direction angle #33-37  (e)Scalar projection #39, 41-44  (f)Work done # 49 | | 4 | Quiz1 |
|  | | Cross product (P-815) Theorem- P-817, Triple product (P-810)  **Application:**  Area (P-818 # 4), volume (P-820), Coplanar( # 5) | P-821  Unit vector #19, 20  Area # 27, 28  Volume # 33, 34  Coplanar #37, 38 | | 1 | Quiz2 |
| **Equations of lines and planes** | | Equations of lines (P-824)  # 1,2,3  Equation of planes (P-827) # 4, 5  Points of intersection # 6  Angle between planes # 7 | P-831  Lines- #2, 4, 7, 10,11, 19-22  Planes- # 23, 24, 26, 27, 33, 34  Angle # 51, 53, 55 | | 2 |  |
| **Function of several variables** | | Definition-P-888  Partial derivatives, Notation of partial derivatives -P-914 Example # 1, 4  Higher derivatives -P-918 Example # 7, 8  Partial Differential Equation -P- 920, Example # 9, 10 | P-925 # 59, 60, 63, 64, 65, 76 (a, e, f), 78(a, d)  P-924 # 15, 17-19, 26, 41, 42 | | 2 | Quiz3 |
| **Maximum and Minimum values** | P-959 Definition, Theorem, Critical Point, Second derivative test (P-961)  Example- #3 | | P-968 # 3, 5, 6, 9, 11 |  | |  |