

## Physics Exams Summary

2012 CP3	Marks	Set
1 Real and imaginary parts of complex numbers	4	ODE
2 Solution of complex variable equation	4	ODE
3 Solution of complex variable equation (roots of unity)	4	ODE
4 Vector proof	4	VEC
5 Distance to planes	4	VEC
6 Inversion of matrices, # of solutions, eigenvalues	8	MAT
7 1st order ODE	6	ODE
8 Change of variables in ODE	6	ODE
9 Distances to planes, computing volumes and areas using vectors, matrix transformations	20	VEC
10 Diagonalization of matrices, Hermitian, powers of matrices	20	MAT
11 Coupled first order ODEs, complementary functions	20	ODE
12 2nd order constant coefficient ODE, particular solutions	20	ODE

2012 CP4	Marks	Set
1 Taylor series	5	CAL
2 L'Hopital's rule	6	CAL
3 Line integrals	6	MIV
4 Directional derivatives	5	MIV
5 Volume integrals	5	MIV
6 Surface/area integrals	8	MIV
7 Propagation of waves in 2 mediums Derive wave equation, energy of wave equation, separation of variables	5	WAV
8 of variables	20	WAV
9 Vector proof, interpretation of curl and divergence, conservative functions	20	WAV
10 Two beads on a string	20	WAV
11 Contour plots and stationary points	20	CAL

2011 CP3	Marks	Set
2 Summing $\exp(ikx)$	3	ODE
3 Scalar and vector operations	4	VEC
4 Intersection of spheres - vector equations of planes	4	VEC
5 Underdamped, overdamped, critically damped oscillators	6	ODE
6 Matrix inversion	5	MAT
7 Determinant proof and properties	7	MAT
8 Eigenvalues and diagonalization	4	MAT
9 2nd order constant coef. ODE + forcing	20	MAT
10 Solutions of 1st and 2nd order ODEs, particular solutions	20	ODE
11 Vector properties and proofs, cosine angles for vectors in space Linear independence and dependence, linear operators, invertibility of matrices	20	VEC
12 matrices	20	MAT

2011 CP4	Marks	Set
2 Series expansions	6	CAL
3 Conservative fields and Stokes theorem	10	MIV
4 Directional derivatives	4	MIV
5 Complete/total derivatives	6	MIV
6 Wave equation: separation of variables	5	WAV
7 Wave equation: phase, group velocities	5	WAV
8 Two particles connected by springs	20	WAV
9 Derive wave equation, reflected waves, energy of wave Curl of field, line integral, independence of path, exact differentials	20	WAV
10 Volume integrals, coordinate transformations and Jacobian	20	MIV
11 Jacobian	20	MIV

2010 CP3	Marks	Set
2 1st order ODE	4	ODE
3 Vector proof	4	VEC
4 Eigenvalues, eigenvectors, linear independence	8	VEC
5 Determinant of upper diagonal matrix	5	MAT
6 de Moivre's theorem	4	ODE
7 Sketching curves in complex plane	5	ODE
8 Volume of parallelepiped	5	VEC
9 Solutions of constant coefficient ODEs, driven oscillators	20	ODE
10 Orthonormal basis, eigenvectors of Hermitian, diagonalization, trace	20	MAT
11 Matrix transformations, hyperbolic functions	20	MAT
12 Variation of parameters, solution of 2nd order ODEs	20	ODE

2010 CP4	Marks	Set
2 Vector proof, conservative fields, curl	6	MIV
3 Dispersion definition	4	WAV
4 Jacobian computation and mass computation	7	MIV
5 Implicit differentiation of several variables	5	CAL
6 Transverse waves on a string	5	WAV
7 Two masses connected by springs, normal modes	7	WAV
8 Series expansion and stationary points	20	CAL
9 Stokes + divergence theorem Equation of plane, volume integrals, arclength computation	20	MIV
10 computation	20	MIV
11 Wave equation, sketch solutions, energy of waves	20	WAV