

## C O N T E N T S

CHAPTER	TITLE	PAGE NO.
I	INTRODUCTION	
1.1	Historical Background	1
1.2	Coherence	5
	1.2.1 Temporal coherence	6
	1.2.2 Spatial coherence	10
1.3	Light waves - Their Interference and Diffraction	17
	1.3.1 Nature	17
	1.3.2 Plane and spherical waves	19
	1.3.3 Interference	22
	1.3.4 Diffraction	28
1.4	Hologram Formation and Wavefront Reconstruction	33
	1.4.1 Principle	33
	1.4.2 Hologram formation	33
	1.4.3 Wavefront reconstruction	36
1.5	Outline of The Present Work	44
	R E F E R E N C E S	48-50
II	DIFFERENT TYPES OF HOLOGRAMS	
2.1	Introduction	51
2.2	Phase Hologram	51
2.3	Volume Hologram	52
	2.3.1 Transmitting hologram	53
	2.3.2 Reflection hologram	56
2.4	Fresnel Hologram	59
	2.4.1 In-line Fresnel hologram	59
	2.4.2 Off-axis Fresnel hologram	64
2.5	Fourier Transform Hologram	67
	2.5.1 Lensless Fourier transform hologram	73

.....contd..

CHAPTER	TITLE	PAGE NO.
2.6	Fraunhofer Hologram	76
	2.6.1 In-line Fraunhofer hologram	76
	2.6.2 Off-axis Fraunhofer hologram	78
2.7	Image Plane Hologram	79
2.8	Experimental Recording of Different Types of Holograms	82
	2.8.1 Essential requirements for recording good quality holograms	82
	2.8.1.1 Vibration isolation	82
	2.8.1.2 Emulsion resolution	83
	2.8.1.3 Beam ratio	83
	2.8.1.4 Exposure	84
	2.8.1.5 Developing and fixing	84
	2.8.1.6 Bleaching	85
	2.8.1.7 Paths traversed by two waves	85
	2.8.2 Different optical components used for recording holograms	86
	2.8.2.1 Beam splitter	87
	2.8.2.2 Mirrors	88
	2.8.2.3 Lenses	88
	2.8.2.4 Beam expander	88
	2.8.2.5 Spatial filters	89
	2.8.2.6 Photographic plate	89
	2.8.3 Recording of Fresnel hologram	90
	2.8.4 Recording of Fourier transform hologram	93
	2.8.5 Recording of lensless Fourier transform hologram	95
	2.8.6 Recording of lensless Fraunhofer transform	98
	2.8.7 Recording of Image plane hologram	101
	2.8.8 Recording of Piggyback hologram	105
2.9	Critical Assessment of Different Kinds of Holograms	108
	REFERENCES	110-112

.....contd..

CHAPTER	TITLE	PAGE NO.
III	HOLOGRAPHIC INTERFEROMETRY	
	3.1 Introduction	113
	3.2 Real-time Holographic Interferometry	114
	3.3 Double-exposure Holographic Interferometry	119
	3.4 Fringe Localization and Interpretation	124
	3.5 Time-average Holographic Interferometry	128
	3.6 Non-destructive Testing with Holographic Interferometry	133
	3.7 Recent Trends in Holographic Interferometry	135
	R E F E R E N C E S	139-143
IV	EXPERIMENTAL WORK ON HOLOGRAPHIC INTERFEROMETRY	
	4.1 Introduction	144
	4.2 Experimental Procedure and Precautions	145
	4.3 Surface Displacement Studies With Double-exposure Holographic Interferometry	147
	4.3.1 Double-exposure holographic interferometry of rubber cork	147
	4.3.2 Double-exposure holographic interferometry of metal disc	152
	R E F E R E N C E S	163-164
V	SUMMARY AND CONCLUSIONS	165-170
	R E F E R E N C E S	171