INSTITUTE OF FORENSIC SCIENCE & CRIMINOLOGY

PANJAB UNIVERSITY, CHANDIGARH

Outlines of Sylla i an! Cou"ses of "ea!in# fo"

M.Sc. Forensic Science

PANJAB UNIVERSITY, CHAN IGARH O!"#ines o$

S%##&'i &n(Co!rses o$ re&(in) $or C*oice B&se(Cre(i"

S%s"e+ ,CBCS-

Ac&(e+ic Session ./.01.2, ./.21.3, ./.31.4

M.Sc. Forensic Science ,Se+es"er S%s"e+-

C*oice

COURSE STRUCTURE

,Sc*e+e-

SEMESTER I

,Cre(i"s 9 ./, M&r:s 9 2//-

Co!rse	P&7er	Cre(i"s	M&r:s	Te&c*in) *rs;<ee:
Co+7!#sor% Core Co!rses				
*!-+,-C,	-eneral *orensic and *ingerprint !cience	4	,..	4
*!-+,-C2	/uman -enetics	4	,..	4
*!-+,-C0	1nstrumentation	4	,..	4
*!-+,-C4	Criminology& Criminal 2aw 3 *orensic Psychology	4	,..	4
*!-P,-C,	-eneral *orensic and *ingerprint !cience 4Pr5	,	26	2
*!-P,-C2	/uman -enetics 4Pr5	,	26	2
*!-P,-C0	1nstrumentation 4Pr5	,	26	2
*!-P,-C4	Crime file/!crap *ile	,	26	2
+7+A2		./	2//	

Pr-Practical

SEMESTER II

,Cre(i"s 9 ./, M&r:s 9 2//-

Co!rse	P&7er	Cre(i"s	M&r:s	Te&c*in) Hrs;<ee:
Co+7!#sor% Core Co!rses				
*!-+2-C,	olecular 8iology and 8iochemistry	4	,..	4
*!-+2-C2	*orensic Chemistry	4		

SEMESTER III

,Cre(i"s 9 .0, M&r:s 9 3//-

Co!rse	P&7er	Cre(i"s	M&r:s	Te&c*in) Hrs;<ee:
Co+7!#sor% Core Co!rses				
*!-+0-C,	*orensic +o"icology and %rugs of A$use	4	,..	4
*!-+0-C2	8allistics	4	,..	4
*!-+0-C0	*orensic 8iology	4	,..	4
*!-+0-C4	*orensic Anthropology& 7steology and 7dontology	4	,..	4
*!-P0-C,	*orensic +o"icology and %rugs of A$use 4Pr5	,	26	2
*!-P0-C2	*orensic 8allistics 4Pr5	,	26	2
*!-P0-C0	*orensic 8iology 4Pr5	,	26	2
*!-P0-C4	*orensic Anthropology& 7steology and 7dontology 4Pr5	,	26	2
isci7#ine S7eci$ic E#ec"i8e , SE- Co!rses ,Se#ec" &n% one Co!rses-?				
*!-+0-+<,-P	+hesis <or)-Part 1 4Physical !cience5	2	6.	4
*!-+0-+<,-C	+hesis <or)-Part 1 4Chemical !cience5	2	6.	4
[illegible]	+hesis <or)-Part 1 48iological !cience5	2	6.	4
Generic E#ec"i8e ,GE- Co!rses ,Se#ec" &n% one Co!rse-= On#ine Co!rse $ro+ S>AYAM ,MOE-				
*!- 77C,	atistics/8io- statistics/ ultivariate Analysis :-!tatistics	2 2 2	6. 6. 6.	
*!- 77C2	Cy$ercrime/Cy$er security/%igital forensics	2	6.	
*!- 77C0	77C	2	6.	
+7+A2		.0	3//	

Pr-Practical

Allotment will

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Co+7!#sor% Core Co!rses				
*!-+4-C,	9uestioned %ocuments	4	, . .	4
*!-+4-C2	%igital *orensics and Cy$er !ecurity	4	, . .	4
*!-P4-C,	9uestioned %ocuments 4Pr5	,	26	2
*!-P4-C2	%igital *orensics and Cy$er !ecurity 4Pr5	,	26	2
isci7#ine S7eci$ic E#ec"i8e , SE- Co!rses ,Se#ec" &n% T<o Co!rses-				
*!-+4-+<2	+hesis <or)-Part 11>>	6	,26	6
*!-+4-%;!-P	*orensic Audio-Bideo Analysis>	4	, . .	4
*!-P4-%;!-P	*orensic Audio-Bideo Analysis>4Pr5	,	26	2
*!-+4-%;!-C	*orensic ;"plosives>	4	, . .	4
*!-P4-%;!-C	*orensic ;"plosives> 4Pr5	,	26	2
*!-+4-%;!-8	*orensic olecular 8iology>	4	, . .	4
*!-P4-%;!-8	*orensic olecular 8iology> 4Pr5	,	26	2
+7+A2		./	2//	

Pr-Practical

>> Compulsory and is the carry forward of +hesis <or)-Part 1 4 *!-+0-+<,-P/C/85.

ar)s split of paper *!-+4-+<2# 6. mar)s 4%issertation wor)5 C 26 mar)s 4e"ternal viva-voce e"amination5.

>Choose any one 4+h and Pr ma)e one course5

E8&#!&"ion

EVALUATION

+o qualify for the award of the PostDgraduate degree of the *aculty of !cience in *orensic !cience 3 Criminology i.e. .!c. 4*orensic !cience 3 Criminology5 a candidate has to successfully complete the course and o$tain at least 6.E in aggregate 4including the internal continuous assessment5 3 4. E in each paper separately in theory 4including the internal continuous assessment5and practical/Assignment. +he students

mar)s5 and a presentation 42. mar)s5 in this regard. +he 1nternal assessment 4,. mar)s5 will $e $ased on attendance& regularity and daily performance.

1n the fourth semester 4 *!-+4-+<25 the evaluation 4,26 mar)s5 will $e done on the $asis of the final thesis su$mission and viva-voice 4conducted $y the e"ternal e"pert duly approved $y the Bice Chancellor/C7;5.

M.Sc. Forensic Science

S%##&'!s1Se+es"er I

MFS1TA1CA= Gener&# Forensic &n(Fin)er7rin" Science

THEORY

Cre(i"s= 0
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*orensic science is the application of a $road spectrum of sciences to answer questions of interest to a legal system. +his may $e in relation to a crime or a civil action. +he paper covers all general aspects of forensic science including definition& nature& needs and evaluation pertaining to forensic investigations. *ingerprint sections include history& development& classification and all the scientific aspects regarding preserving and e"amination.

UNIT1I

	, Gature& Geed and Alternatives to forensic science
	;vidence# +ypes and relevance& 2aws and Principles
	Pro$lems of proof# -eneral& !cientific evidence and proof& 1nvestigative pro$lems& !cientific aspects& 2egal pro$lems
	;"pert +estimony# ;"pert& :eport& 1llustrations& 2anguage& Prosecuting Counsel& %efense Counsel& ;ye witness testimony& emory recovery& !tatement verification.
	Court# *allacies a$out e"pert evidence
	*rye case 3 %au$ert !tandard

UNIT1II

	Comparison of fingerprints& $asis of comparison& class characteristic& individual characteristic& various types of ridge characteristics
	Automatic fingerprint identification system& ;"pert 7pinion <riting
	7ther prints# 2ip print& palm print& foot print and ;ar print- their applications.

	4with 1llustrations& !)etches& %iagrams& Photos etc.5 2aw 8oo) Co. Allaha$ad 4,KK65
	enIel& ;. :olandN *ingerprint detection with lasers. arcel %e))er& GA 4,KK.5
	altoni& %avideN /and$oo) of fingerprint recognition !pringer Berlag. GA42..05

S!))es"e(Re&(in)	
	*orensic !cience 1nternationalN *orensic !cience 1nternational# :eports - ;lsevier
	!cience 3 Fustice - ;lsevier
	2aw 3 Policy - <iley 7nline 2i$rary
	Australian Fournal of *orensic !ciences - +aylor 3 *rancis
	Fournal of *orensic !cience- <iley 7nline 2i$rary

MFS1PA1CA= Gener&# Forensic &n(Fin)er7rin" Science ,Pr-

PRACTICAL

MFS1TA1C.= H!+&n Gene"ics
THEORY

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+his paper consists of $asic genetics-$lood grouping of

,0	2a$oratory procedures in /uman -enetics& Bol. ,, # 8iochemical ethodology !harma& A.& +alu)der& -. and u)her?ee& !.M.& ,KJH& +he Gucleus& Calcutta.
,4	Practical Cytology& applied -enetics and 8iostatistics -oswami& /.M.
,6	+he Principles of /uman 8iochemical -enetics /arris& /.
,H	-enetics and medicine +hompson and +hompson.
,J	8lood groups serology 8oorman& %odd

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THEORY

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	techniques i.e. +ime of flight 4+o*5& A2%1& 1nductive coupled plasma 41CP5.

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,.	@ndergraduate 1nstrumental Analysis& J th ;dition& Fames <. :o$inson& ;ileen .!. *rame& - *rame 11. 42.,45
2.	Principles of 1nstrumental Analysis- !)oog& /oller 3 Crouch J th ;dition
0.	1nstrumentation ethods of Analysis D <illard erritt 3 %ean !ettle& J th [redacted] ion& 2..4
4.	*orensic !cience /and $oo)- :. !aferstain& Bolume ,& 0 rd edition
6.	1ntroduction to spectroscopy& %onald 2 Pavia& -ary . 2ampman& and -eorge !. MriI& Cengage 2earning& 4 th edition& 2.,6.
H.	Chapmen F:N Practical 7rganic ass !pectrometry- A -uide for Chemical and 8iochemical Analysis& <iley 3 sons& 2 nd editon& GA4,KK05
J.	1nstrumental ethods 7f Chemical Analysis& -.:. Chatwal& !.M. Anand& /imalya Pu$lishing /ouse-2.,,& 6 th revised edition

S!))es"e(Re&(in)	
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	!cience 3 Fustice D ;lsevier
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	Australian Fournal of *orensic !ciences - +aylor 3 *rancis
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PRACTICAL

	Cre(i"s= A M&r:s= .2
micr#s& @ v1a+A!ñ icr s$% F4)=f0	+o measure the various physical parameters of fi$er samples using microscope
6. 0	+o find out the un)nown concentration of the

X ß1

fi)flad4%0 3a€ ö3Eß1 ~@ C!=ó ð3n ¿uó2Óð8~ ¿

MFS1TA1C0= Cri+ino#o)%, Cri+in&# L&< &n(Forensic Ps%c*o#o)%
THEORY

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+he realm of criminology ta)es up its scope and development& causes& control& criminal $ehavior and its theories. 1n criminal law the detailed description is provided regarding 1ndian penal code& criminal procedure code

+heory and validity of /ypnosis in forensic science

Garco analysis& -eneral Procedure& 2egal and ;thical aspects& /uman rights of individual

Reco++en(e(Boo:s=	
	*orensic !cience in Criminal 1nvestigation 3 +rials& 8.:.!harma& Hth edition& 2.2. th edition&2.,0
2.	+he /and 8oo) of *orensic Psychology& <einer /ass& 4
0.	/and 8oo) of *orensic Psychology& 7(%onohue 3 2evens)y& 2..4
4.	8rain ;"perience D C.:. u)undan&2..J
6.	Criminal Profilling D 8.+urvey& 2.2.
H.	1nvestigative *orensic /ypnosis D F. Giehans&,KK8
J.	Art 3 !cience of the Polygraph +echniques D F.A. atte& ,K8.
8.	/and 8oo) of Polygraph +esting D .Mloinen& 2..2
K.	%etecting 2ies 3 %eceit D A.Bri?& ,KKK
,..	Pin)er& !. 42.,,5. . Gew Aor)& GA# Bi)ing
,,.	Pin)er& !. 42..J5. . Gew Aor)& GA# Bi)ing.
,2.	+he Adapted ind# ;volutionary Psychology and the -eneration of Culture& ,,KK25 7"ford @niversity

M.Sc. Forensic Science

S%##&'!s1Se+es"er II

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THEORY

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+his paper will $e a melting pot of)nowledge ?ust li)e forensic science. 1t will $ring together all the main streams of $iology that hold a place of their own now. +he)nowledge imparted $y these individual sciences will lead to a wholesome view of the $iomolecules and their $asic units along with an insight into forensic micro$iology. 1n the coming times wars will not $e fought with guns and tan)s& they will $e fought will strategies involving micro$es.

,, 8iocrimes& icro$ial *orensics& and the Physician

2.	1solation of Plasmid %GA& : estriction enIyme digestion D ligation of plasmid %GA
0.	! tudy 4o$servation5 of some pathogenic *ungi

UNIT1III

	Arson D %efinition under 1PC& Gature of fire& Progress& Control& 8urnt $odies& !eat and time of fire& Gatural causes of fires& suspected arson& motives& person responsi$le
	!earch and collection of evidence& 1solation and e"traction of accelerants& analysis $y -C/-C- ! method.
	Petroleum products-production& Classification and properties
	1!1 of -asoline& Merosene and %iesel 4/!% 3 2%75
	Analysis of -asoline& Merosene and %iesel 4/!% 3 2%75& *orensic relevance

UNIT1IV

	Analytical Chemistry# 7verview& !ample collection& Preservation and Preparation
	Analysis# 1onic equili$rium& p/ scale& hydrolysis& solu$ility and ionic product.
	%isposition# A$sorption& %istri$ution& ;"cretion and 1nfluencing *actors
4	%etection of drugs in alternative

MFS1P.1C.= Forensic C*e+is"r% ,Pr-

PRACTICAL

	%ifferential solu$ility and +2C& 1nfra-red spectroscopy& Pyrolysis - as Chromatography& ass !pectrometer& ;lemental analysis of the pigments

UNIT1II

	*i$er# *i$er as Physical ;vidence& fi$er recovery& *i$er1dentification# Physical matching& icroscopic ;"amination& solu$ility test& Chromatographic and !pectroscopic analysis 4@B-Bis 3 *+1:5 of *i$re.
	Paper# Physical e"amination& <atermar) ;"amination& Chemical Analysis& Analysis $y *+1:.

UNIT1III

UNIT1IV

	-lass# +ypes of -lass-!oda lime glass& 8orosilicate glass& !afety glass& 2aminated& 2ight sensitive glass& +ampered/toughened glass& <ire glass& Coloured glass.
	Physical parameters of glass# *luorescence under @B radiation& %ensity or !pecific gravity& %ensity measurements for $igger fragments of glass& %ensity comparison $y flotation and density gradient tu$es.
	:efractive 1nde"

	Australian Fournal of *orensic

H.	Corrective action& Preventive action Control of records# ethod of corrections in document
J.	anagement :eview D 7$?ectives& organiIation of management review& planning& implementation& records
8.	+echnical requirements D -eneral& Personnel
K.	Accommodation and environmental conditions& +ests and cali$ration methods and Analytical method validation
,..	;quipment& easurement tracea$ility& !ampling& !ampling plan& /andling of test and cali$ration items
,,.	Assuring the quality of test and cali$ration results& :eporting the results
,2.	-ood la$oratory practices 4-2P5# *undamental points& :esources& :aw data and data collection& !P7s
,0.	-ood documentation
,4.	2a$ safety

saecation

UTC&SD1T Là RcRYU

UNIT1II

	1nternal Audits& +erminology& 7$?ectives& 7rganiIation of internal audits
	Planning of audit& 1mplementation of internal audits& *ollow up of corrective action
	:eà ateology'V@ßP / an/f@äSRVßP 7$?ectt% "CfflFfpà 5Vff / aFfpfi L

Aa59K ftatisonn#Vßmh

:eportg Ry%ffa

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PRACTICAL

		Cre(i"s= A M&r:s= .2
	SPSS;Rpracticals on computer# +o cover those techniques of data preparation needed prior to data analyses& practical implementation of statistical analyses methods.	
	Practicals on	

Generic E#ec"i8e ,GE- Co!rses ,Se#ec" &n% one Co!rse-= On#ine Co!rse $ro+ S>AYAM ,MOE-

77C	77C on :esearch Pu$lication ;thics& :esearch ;thics and Plagiarism& Academic and :esearch :eport <riting& :esearch ethodology& ;nglish for :esearch Paper <riting	2	6.	

M.Sc. Forensic Science

S%##&' !s1Se+es"er III

. Pesticides 47Ps 1nsecticides& Pesticides and Car$amates# 4i5 alathion& chlorpyrifos& monochrotophos& dimethoate 4ii5 2indane& %%+ 4iii5 Propo"ure& !even5

Plant Poisons 4Canna$is& 7piates& Calotropis& %hatura& :icimus etc.5

+2C

* %rugs 48enIodiaIepines& 8ar$iturates# Pheno$ar$ital& !eco$ar$ital& Paracetamol& %iaIepam& 2oraIepam& AplraIolam etc.5

. Pesticides 47Ps 1nsecticides& Pesticides and Car$amates# 4i5 alathion& chlorpyrifos& monochrotophos& dimethoate 4ii5 2indane& %%+ 4iii5 Propo"ure& !even5

Plant Poisons 4Canna$is& 7piates& Calotropis& %hatura& :icimus etc.5

;"traction of non-volatile organic poison from viscera $y !olid-phase e"traction 4!P;5 method

:einsch test for etallic Poisons 4Arsenic& ercury& Antimony& and 8ismuth5

icroscopic identification Canna$is and analysis of al)aloids $y Colour test 4%equenois 2evine5& +2C and @B-Bisi$le !pectroscopy

%etecting presence of Aluminum/Rinc phosphide in given e"hi$it

%etermination of !alicylate $y visual colorimatery

Analysis of plant poison plants 4any of %atura& Calotropis& :icimus5 al)aloids $y @B-Bisi$le !pectroscopy

%etermining the quantity of 7Ps 4any of Chlorpyrifos& onochrotophos& %imethoate5 in un)nown/suspect samples using @B-Bisi$le technique

9uantitative analysis of drugs 4phenoarital& paracetamol& AlpraIolam& loraIepam5 in un)nown/suspect sample using @B-Bisi$le technique

MFS1TD1C.= B&#is"ics

THEORY

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8allistics is the science of mechanics that deals with the flight& $ehavior& and effects of pro?ectiles& especially $ullets& gravity oms& roc)ets etc. 1t also deals with the art of designing and accelerating pro?ectiles so as to achieve a desired performance. +his paper includes history of fire arms& ammunition& internal and e"ternal $allistics& terminal $allistics& fire arm e"amination& gunshot residue analysis and fire arm in?uries.

,	UNIT1I
	/istory of *irearms& classification and characteristics of firearms& components of small arm firearms& smooth $ore and rifled firearm& $ore and cali$er& cho)e&
2	different systems and their functions& Arms Act Purpose of rifling& types of rifling and methods of producing rifling& trigger and firing mechanism& +heory of recoil& identification of origin& improvised/
0	country-made/ imitative firearms and their constructional features Ammunition and their components& classification and constructional features of different types of cartridges& head stamp mar)ings& various types of $ullets and
4	compositional aspects& latest trends in their manufacturing and design. +ypes of primers and priming composition& propellants and their compositions& Belocity and pressure characteristics under different conditions& ;"plosives Act

UNIT1II

	1nternal 8allistics# %efinition& ignition of propellants& shape and siIe of propellants& manner of $urning& various factors affecting the internal $allistics# loc) time& ignition time& $arrel time& erosion& corrosion and gas cutting
	;"ternal 8allistics# Bacuum tra?ectory& effect of air resistance on tra?ectory& $ase drag& drop& drift& yaw& shape of pro?ectile and sta$ility& tra?ectory

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THEORY

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*orensic $iology is introduced with all its components i.e. forensic entomology& serology& $otany& wildlife& limnology etc. 1t deals with forensic entomology& forensic wildlife& and forensic $otany. +his unit gives the students an insight into the

	Press
	%GA 8arcodes ethods and Protocols ;ditors# 2opeI& 1da& ;ric)son& %avid 2. 4;ds.5 2.,2 /umana Press
	Guide to ... Protocols ;ditors# ayer& ... 4;d.5 2..K /umana Press

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	*orensic !cience 1nternationalN *orensic !cience 1nternational# :eports - ;lsevier
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	C*) 9 ?,/ 5 D/5E/ C.*5
	Australian Fournal of *orensic !ciences - +aylor 3 francis
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MFS1PD1CD= Forensic Bio#o)% ,Pr-

PRACTICAL

CrcA Y

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	methods& ancient %GA yield& ancient %GA preservation& ancient %GA degradation patterns& the age of ancient %GA& *ragment lengths of ancient %GA& storage of ancient %GA e''tracts.

Reco++en(e(Boo:s	
	*orensic Anthropology 2a$oratory manual !teven 8yers and !usan& yster. Allyn and 8acon Pu$lishers&2..6
	/uman osteology# A la$oratory and field manual <illiam . $ass # issouri Archaeological !ociety
	+he human $one manual +im <hite and Pieter *ol)ens Academic press&2..6
	*orensic Archaeology# Advances in +heory and Practice $y Fohn /unter& argaret Co'' 4:outledge +aylor and *rancis -roup5&2..6
	Ancient %GA +yping# ethods& !trategies& and Applications $y !usanne /ummel 4Pu$lished $y !pringer5&2..0
	/uman 7steology in Archaeology and *orensic !cience# 1n Archaeology and *orensic !cience argaret Co''& !imon ays Cam$ridge @niversity Press& 2...
	Anthropometry !ingh& 1.P. and 8hasin& .M& ,K8K

S!))es''e(Re&(in)	
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	Fournal of *orensic and legal edicine#

M.Sc. Forensic Science
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THEORY

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9uestioned document e"amination is the forensic science discipline pertaining to documents that are 4or may $e5 in dispute in a court of law. +he primary purpose of questioned/forensic document e"amination is to answer question a$out a disputed document using a variety of scientific processes and methods. +he most common type of e"amination involves handwriting wherein the e"aminer tries to address concerns a$out potential authorship. +his paper includes Gature and pro$lems of document e"amination& $asis of handwriting identification& identification of type writing& printing of security documents& and determination of age of document& e-document& digital signatures and opinion writing.

UNIT1I

	Gature and pro$lems of document e"amination& classification of documents& procurement of standard admitted/specimen writings& handling and mar)ing of documents& preliminary e"amination of documents.
	8asis of handwriting identification D individuality of handwriting& natural variation& process of comparison&
	Barious types of documents D genuine and forged documents& holographic documents.
	Barious writing features and their estimation& general characteristics of handwriting& individual characteristic of handwriting.
	8asic tools needed for forensic documents e"amination and their uses.

UNIT1II

,.	%isguised writing and anonymous letters
2.	1dentification of a writer& ;"amination of signatures D characteristics of genuine and forged signature&
0.	;"amination of alteration& erasers& overwriting& additions and o$literations&
4.	Barious types of in)s and paper& their chemical compositions& characteriIation and elemental analysis
6.	%ecipherment of secret& indented and charred documents

,0	+o analyIe handwriting and its applications towards the identification of writer
,4	+o perform the comparison $etween different typewritten materials.
,6	%istinguish $etween genuine and forged signature
,H	+o study the characters of documents printed $y different printers
,J	%ecipherment of documents altered using correction pen.

Perform any ,2 practical

MFS1T01C.= i)i"&# Forensics &n(C%'er Sec!ri"%

THEORY

	Cre(i"s= 0 M&r:s=A// Se+es"er= EB&+ C/ In"ern&# Assess+en" ./

%igital forensics is a $ranch of forensic science pertaining to legal evidence found in computers and digital storage media. Computer forensics is also)nown as digital forensics. Computer *orensic includes Principles of Computer& methods of scoring data& /ardware Passwords and encryption techniques& seiIure of computers& investigation on various imaging methods& forensic e"amination procedure for storage media& Cy$er Crimes& overview of several operating systems& registries and 2inu" $asics.

UNIT1I

%efinition of digital forensics& need& scope& principles& relevant laws 41;A 46A& H68& HH& HJ& and JKA of 1+ Act& 2...5& 1ntermediaries :ules 2.,,& search and seiIure of digital evidences& concept of hashing& methods of live and dead acquisition& write $loc)ers and their usage& open source software for data acquisition and authentication& cloning& imaging& wiping.

UNIT1II

8asics of computer& input and output devices& computer hardware and software& history of computers& generation of mo$ile phones& storage and its types 4:A &:7 & cache5& computer operating systems 4<indow& 2inu"& ac7!5& o$ile operating system& file system& types of file system& process of writing data on hard drive& concept of $it loc)er encryption system&)nowledge of 2AG& <AG& <i-*i& 2i-fi& 1nternet protocol& 1P address& analysis of digital data from storage devices 4hard dis)& %B:& cell phone& memory card& !1 card& drone& etc.5& using open source tools.

UNIT1III

UNIT1IV

Cy$er security- concept of cy$er security& incidence response management& cy$er

S.No	Reco++en(e(Boo:s Rn..,
,.	/and $oo) of computer crime investigation& ;oghan Casey& ;lsevier.2..,
	Computer crime-A crime fighter(s hand $oo)& %avid 1cove& M. !eger and <.Bonstorch& 7(reily 3 Alseriates& 1nc.,KK6
	%igital evidence and computer crime-*orensic science& computers and the internet& Casey& Academic press.0 rd ;d. 2.,,
4.	Computer forensics-Computer crime scene investigation& ... *irewall ;edia& Gew

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MFS1T01 ES1P= Forensic A!(io1Vi(eo An&#%sis

THEORY

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*orensic Audio Video Analysis is the scientific examination, comparison and /or evaluation of audio-video in legal matters. +his paper includes Audio 2evel measurement, noise characteristics sound recording play $ac) devices, authentication of recorded audio, introduction to video & speech processing, digital image processing, image enhancement, restoration, forensic analysis of Audio/Video recording, basic factors of sound, speech, acoustic speech production, phonetic aspects of speech speaker identification etc.

UNIT1I

	Audio 2evel measurement Decibel levels, frequency measurement, range, spectrum analysis, filters, Circuits
	Goise Characteristics, Goise, Convolution Goise, Acoustic Characteristics of Environments, Conventional *ilters, %igital *ilters, Adaptive noise cancellation, Audio- enhancement
	!ound :ecording/Play$ac) %evices# Analog +ape recorders, %igital recorder, icrophone +ypes 3 Advantages/disadvantages, %igital
	Authentication of recorded audio# +ype of alterations, Auditory ;"amination $y Critical 2istening. <aveform analysis, speech !pectrographic analysis. agnetic developing, 7ptical ethod.

UNIT1II

	1ntroduction

	Bowel& Consonant and -lides& 1PA 4+he 1nternational Phonetic Alpha$ets5 *orensic Phonetics& Phonetics in !pea)er 1dentification& Co-articulation& ;ffect of conte"t&!upra segmental 4Prosodic features5-!tress& +one& 1ntonation& %uration& !ylla$les& Gasalisation& Accent features& Psychological !tress.
	!pea)er :ecognition# Principles of spea)er recognition/ identification& ethods on !pea)er :ecognition& Aural& !ound !pectrographic& Automatic ethod

MFS1P01 ES1P= Forensic A!(io1Vi(eo An&#%sis ,Pr-
PRACTICAL

	Properties of e"plosives# !trength or power of e"plosives& 8risance& !ensitivity or specificity of e"plosives& :elative effectiveness factor& !ta$ility& %ensity& Bolatility& /ygroscopicity& 7"ygen $alance& +o"icity& elt cast
	!hoc) wave/$last wave# -eneration of the shoc) wave& Characteristic&

	!pectrometric 1dentification of organic Compounds 48th ;dition5& $y :o$ert . !ilverstein and *rancis L. <e$ster& pu$lished Fohn <iley 3 !ons& 1nc. Gew Aor).2.,4.
	1nstrumental ethods of Analysis4Jth ;dition5

	Aptamers and affi$ody# forensic applications
	Protein engineering and invitro evolution for ma)ing proteins for forensic application
	Concept of antigen- anti$ody reaction and application to species identification
	onoclonal and polyclonal anti$odies

UNIT1IV

,.	G-! 4ne"t generation sequencing techniques of %GA5# principles
2.	Protocols in G-!
0.	Application of G-! in forensics
4.	Automation in %GA profilling# ro$otics
6.	iniaturisation in %GA profilling# microfluidics
H.	:ecent developments in %GA profilling and data$ases

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2	1nman& M. 3 G. :udin. ,KK8. 1ntroduction to *orensic %GA Analysis. C:C Press& 8oca :aton.
0	8oca :aton. -riffith& /. 3 . Annette& eds. ,KK4. PC: +echnology# Current 1nnovations. C:C Press& 8oca :aton.
4	Mir$y& 2.+. ,KK.. %GA *ingerprinting# An 1ntroduction. <./. *reeman& Gew Aor).
6	MrawcIa)& . 3 F. !chmidt)e. ,KK4. %GA *ingerprinting. 8ios !cientific Pu$lishers& 7"ford.
H	2andwe$er& 2.*. 3 A.P. %o$son. ,KKK. -enetics and the ;"tinction of !pecies# %GA and the Conservation of 8iodiversity
J	<alls& /.F. ,KH8. *orensic science# An 1ntroduction to the !cience of Crime 1nvestigation. Praeger& Gew Aor)
8	8ar)er& M. ,KK8. At the $ench# A la$oratory navigator. Cold !pring /ar$or 2a$oratory Press& Gew Aor).
K	8utler& Fohn . 2..,. *orensic %GA +yping. Academic Press& !an %iego.
