SCHEME OF TEACHING AND EXAMINATION(FIRST AND SECOND SEMESTER)

Theory	Subject	Teaching Hours per week				Exam Marks	Sessional Marks	Total Marks
First Semester		L	T	P	C			
!	Foo" Engineering	#		$	%	&'	&'	''
!(	)iochemical Engineering	#		$	%	&'	&'	''
!#	Foo" Sa*ety an" +uality Management	#		$	%	&'	&'	''
!%	Selecte" Topics o* Cereals, -ilsee"s an" Pulses	#		$	%	&'	&'	''
!&	Functional Foo"s an" .utraceuticals	#		$	%	&'	&'	''
Practicals								
! !	)iochemical Engineering$/	$	$	(			(&	(&
! !(	Foo" Process Engineering	$	$	(			(&	(&
Total		&	&	%	((	(&'	#''	&&'

L: Lectures !ee"

T:Tut#r$%& 'ee"

(: (r%ct$c%&s H#urs 'ee"

C: Nu)*er #+ Cre,$ts

SCHEME - F TE6CH/ . 7 6 . 2 E86M/ . 6T/ - . 9TH/32 : F - ; 3TH SEMESTE3<

T-e#r.	Su*/ect	Te%c-$01 H#urs 2er ! ee"				E3%) M%r"s	Sess$#0%& M%r"s	T#t%& M%r"s
T-$r, Se) ester		L	T	(	C			
456	A0%&.t$c%& Tec-0$7ues	4		-	4	80	49	:9
452	E&ect$;es	8		-	8	90	90	600
454	(re&$) $0%r. t-es$s			20	60	-	-	-
T#t%&		:		20	6:	<0	=9	6:9
F#urt- Se) ester								
856	T-es$s	-	-	40	69	-	-	-
T#t%&				40	69	-	-	-

 # *Preliminary thesis* will be evaluated on the basis of seminar presentations and discussions and the candidate shall be awarded 'S' grade i.e. satisfactory for continuation or else 'X' grade i.e.unsatisfactory.

- List of Electives FT .2 Any one to be offered
  1. Advanced Food Microbiology
  2. Advanced Food Biotechnology
  3. Food Rheology and Texture
  4. Thermal and Non Thermal Processing of Foods
  5. Nanotechnology
  6. I0,ustr$%& (#&ut$#0 C#0tr#& %0, A*%te) e0t

NOTE

The student is re uired to make seminar presentation s of the results achieved before the submission of

the thesis.

1. The Post Graduate Student Research Committee PGRC of the Institute will evaluate the Thesis.

The constitution of the committee is as under

a. Chairperson of the institute

b. Senior professor of the institute

c. Supervisor s

d. External examiner

2. The PGRC will evaluate the final thesis based on an open house presentation by the student which will be attended by the faculty members PG students and other research scholars of the institute.

. No marks are assigned to Preliminary Thesis and Thesis evaluation work. On successful completion and presentation of Research Seminars the candidate will be awarded 'S' grade i.e. satisfactory or else 'X' grade i.e. unsatisfactory.

. Re uirement for the award of M.E. in Food Technology degree is credits with minimum CGPA of .0 and successful completion of thesis work.

SYLLABUS FORM. E. FOOD TECHNOLOGY **FIRST SEMESTER**

FT ! Foo" Engineering

Paper Title Elective Theory

Paper Code FT 1.1 ’ Max. Marks 0 ’Credits ’ Time hours

Course Duration Lectures of one hour each.

Note for the Paper setter The uestion paper should be divided into Section A and Section B Total of uestions. uestions from section A and uestions from section B are to be set. The students will be re uired to attempt uestions selecting at least 2 from each section.

SECTION A

E01$0eer$01 (r#2ert$es #+ +##,s> t-e$r s10+$c%0ce %0, $) 2#rt%0ce $0 e7u$2) e0t %0, 2r#cess ,es$105 Ste%,. st%te %0, u0ste%,. st%te -e%t tr%0s+er5 Nu) er$c%& 1r%2-$c%&) et-#,s $0 t-e %0%&.s$s #+ -e%t tr%0s+er5 S#&ut$#0s #+ u0ste%,. st%te e7u%t$#0s5

?$0et$cs #+ *$#&#1$c%& re%ct$#0s-#r,er #+ re%ct$#0> 7u%&$t. c-%01es ,ur$01 st#r%1e #+ +##,s5 A22&$c%t$#0 #+ Arr-e0$us e7u%t$#0s t# *$#&#1$c%& re%ct$#0s5 F##, 7u%&$t.) #,e&&$015

(r$0c$2&es #+ Re+r$1er%t$#05 N%tur%& re+r$1er%t$#0> @%2#ur c#) 2ress$#0 re+r$1er%t$#05 M#&&$er C-%rt> R%t$01 #+ S.ste) s> C#) 2ress#rs> e;%2#r%t#rs> C#0,e0sers> E32%0s$#0 ;%&;e5 He%r (u) 2> A*s#r2t$#0 re+r$1er%t$#05

SECTION B

Free A$01 #+ +##,s> 2re,$ct$#0 #+ +reeA$01 t$) e5

T-er) %& (r#cess$01 +##,s5 (%steur$A%t$#0 %0, ster$&$A%t$#0> D ;%&ue> F ;%&ue> B ;%&ue5 (r#cess t$) e c%&cu&%t$#05 C##" ;%&ue %0, 7u%&$t. rete0t$#05 T$) e te) 2er%ture $0te1r%t#rs (TTI)5 M$cr#*$%& sur;$;%& cur;e5 Let-%&$t.> B%&&) et-#,5 (r#cess c%&cu&%t$#0 *. 1r%2-$c%&) et-#,5

Re+ere0ce B##"s

He&,) %0 %0, S$01-5 6<<95 I0tr#,uct$#0 t# F##, E01$0eer$015 Ac%,e) $c (ress5

McC%*e ' L> S) $t- CC %0, H%rr$#tt (5 6<<45 D0$t #2er%t$#0s #+ C-e) $c%& E01$0eer$015 McGr%! H$&&s5

FT !( )iochemical Engineering

Paper Title Elective Theory

Paper Code FT 1.2 ' Max. Marks 0 'Credits ' Time hours

Course Duration Lectures of one hour each.

Note for the Paper setter The uestion paper should be divided into Section A and Section B Total of uestions. uestions from section A and uestions from section B are to be set. The students will be re uired to attempt uestions selecting at least 2 from each section.

c#0t$0u#us *$#&#1$c%& re%ct#rs5 Fer) e0t%t$#0 tec-0#&#1.> 2r#,uct) %0u+%cture *. +er) e0t%t$#0> re%ct#rs +#r *$#) %ss 2r#,uct$#05

D# ! 0stre%) 2r#cess$01> 2r$) %r.> sec#0,%r. %0, tert$%r. 2r#,ucts5

(r#,uct$#0 #+ $0,ustr$%& 2r#,ucts> c%se stu,. #+ +e ! 2r#,ucts5 ' %ste ! %ter e01$0eer$015 Ge0et$c%&&.) #,$+$e, +##,s5

Reference Book

65 Biochemical Engineering Fundamentals by J. E. Bailey D. F. Ollis McGraw Hill Book Company 1 .
25 Biochemical Engineering by H. W. Blanch D. S. Clark Marcel Dekker Inc. 1 ⌐.
.Bioprocess Engineering Basic Concepts by M. L. Shuler F. Kargi Prentice Hall of India 200 .

FT !# Foo" Sa*ety an" +uality Management

Paper Title Elective Theory

Paper Code FT 1. ' Max. Marks 0 'Credits ' Time hours

Course Duration Lectures of one hour each.

Note for the Paper setter The uestion paper should be divided into Section A and Section B Total of uestions. uestions from section A and uestions from section B are to be set. The students will be re uired to attempt uestions selecting at least 2 from each section.

SECTION A

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C#0ce2t #+ 7u%&$t.) %0%1e) e0t> #*/ect$;es> $) 2#rt%0ce F +u0ct$#0s #+ 7u%&$t. c#0tr#&> 7u%&$t.

SYLLAB

FT !% Selecte" topics o* Cereals, -ilsee"s an" Pulses

Paper Title Elective Theory

Paper Code FT 1. ' Max. Marks 0 'Credits ' Time hours

Course Duration ' Lectures of one hour each.

Note for the Paper setter The uestion paper should be divided into Section A and Section B Total of uestions. ' uestions from section A and ' uestions from section B are to be set. The students will be re uired to attempt uestions selecting at least 2 from each section.

SECTION A

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St#r%1e #+ cere%& 1r%$05 l0sect $0+est%t$#0 c#0tr#&) e%sures5 Detect$#0 #+ $0sect %0, r#,e0t $0+est%t$#0 #+ cere%&s5R$ce) $&&$01> r$ce 2r#,ucts> r$ce *%se, +er) e0te, 2r#,ucts5 (%r*#$&$01 #+ 2%,,.5

' -e%t) $&&$01 %0, c&e%0$01 e7u$2) e0t> *u&1ur ! -e%t5 Fe) e0te, %0, &e%;e0e, 2r#,ucts #+ ! -e%t>) %c%r#0$5 Fer) e0te, %0, &e%;e0e, 2r#,ucts +r#) ! -e%t5 D#u1- r-e#&#1.5 l) 2#rt%0ce #+ 1&%ss tr%0st#0 te) 2er%tures $0 cere%&5

Test$01 #+) $&& st#c"s *. su$t%*&e e7u$2) e0t &$"e A) $&#1r%2-> E3te0s#1r%2-> +%r$0#1r%2- etc5

SECTION B

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S0%c"s c#r0 c-$2s> e32%0,e, s0%c" 2r#,ucts> e3trus$#0 c##"$01 #+ cere%& *%se, 2r#,ucts5

M$&&$01 #+ *%r&e.> #%ts> r.e> s#r1-u) >) $&&ets etc5 N%t$#0%& %0, $0ter0%t$#0%& st%0,%r,s #+ 7u%&$t. #+ ;%r$#us cere%& %0, cere%& *%se, 2r#,ucts5

B.-2r#,ucts ut$&$A%t$#0 #+ cere%& 2r#cess $0,ustr.5 Cere%& *%se, %0$) %& +ee,> ! -e%t 1er) > c#r0 #$&5

A,;%0ce, tec-0#&#1. #+ M$&&$01 #+ 2u&ses5

Ge**0**er%& c-e **)** $str. %**0**, %**0**%&.t$c%& **)** et-#,s #+ c-%r%cter$A%t$#**0** #+ +%ts %**0**, #$&s5 **H**u%&$t. st%**0**,%r,s #+ e,$*&e #$&s %**0**, +%ts> r%**0**c$,$t.5 F%ts %**0**, #$&s $**0** ,$et> **0**utr$t$#**0** %**0**, ,$se%ses5 Detect$#**0** #+ %,u&ter%t$#**0**s> tr%**0**s +%t5 C-e **)** $c%& A,/u**0**cts> &ec$t-$**0**> **)** #**0**#1&.cer$,es %**0**, ,er$;%t$;es> **2**#&. **2**r#**2**.&e**0**e **1**&.c#& esters> **2**#&. **1**&.c#& esters> s-#rte**0**$**01**> **)** %**0**u+%cture %**0**, uses #+ s-#rte**0**$**01**> t.**2**es #+ s-#rte**0**$**01**s> M%r**1**er$**0**e **)** %**0**u+%cture **2**r#cess %**0**, $ts uses5 M%.#**00**%$se %**0**, s%&%, ,ress$**01**s5 C#**0**+ect$#**0**%r. c#%t$**01**s5 **(**e%**0**ut ***u**tter %**0**, ;e**1**et%***&**e **1**-ee5 **(**%c"%**1**$**01** %**0**, st#r%**1**e #+ +%ts %**0**, #$&s5 F%t su***st$tutes5

Re+ere**0**ce B##"s:

65 **?**e**0**t> N5L5 Tec-**0**#&#**1**. #+ Cere%&s> CBS **(**u***&$s-er5

25 **(**# **)** er%**0**A> Y5 : **'** -e%t C-e **)** $str. %**0**, Tec-**0**#&#**1**.> CHI**(**S B##"> **D**SA5

45 T%**0**&e. A5 **'** %ts#**0** **F** **(**%u& E5 R% **)** st%, : C#r**0** C-e **)** $str. %**0**, Tec-**0**#&#**1**.> ADCC> **D**SA5

85 Cu&&$%**0**#> B5O5 R$ce C-e **)** $str. %**0**, Tec-**0**#&#**1**.> AACC> **D**SA5

95 **(**%**0**,e.> **(**5H5 **(**#st H%r;est Tec-**0**#&#**1**.5

G5 B%$&e. : F%ts %**0**, O$&> **'** $&e.> **D**SA5

:5 **'** $&&$%rs> **(**5N5 **F** De;$**0**e> C5 : T-e C-e **)** $str. **F** Tec-**0**#&#**1**. #+ E,$*&e O$&s **F** F%ts

!&! Functional Foo"s an" **.**utraceuticals

I**0**tr#,uct$#**0** t# Nutr%ceut$c%&s Fu**0**ct$#**0**%& +##,s: ,e+$**0**t#**0**s> s.**0**#**0**. **)** #us ter **)** s> ***%s$s +#r c&%$ **)** s +#r % c# **)** **2**#u**0**, %s % **0**utr%ceut$c%&> re**1**u&%t#r. $ssues +#r **0**utr%ceut$c%&s $**0**c&u,$**01** CODEX FSSAI5

C#**0**ce**2**t #+ %**01**$#**1**e**0**es$s %**0**, t-e r#&e #+ -e%&t- +##,s> Nutr%ceut$c%&s +#r c%r,$%c ,$se%se> c%**0**cer> ,$%*etes> c-#&ester#& **)** %**0**%**1**e **)** e**0**t> #es$t.> /#$**0**t **2**%$**0**> $ **)** **)** u**0**e e**0**-%**0**ce **)** e**0**t> %**1**e re&%te, **)** %cu&%r ,e**1**e**0**er%t$#**0**> e**0**,ur%**0**ce **2**er+#r **)** %**0**ce %**0**, **)** ##, ,$s#r,ers-c# **)** **2**#u**0**,s %**0**, t-e$r **)** ec-%**0**$s **)** s #+ %ct$#**0**> ,#s%**1**e &e;e&s> c#**0**tr%,ct#**0**s $+ %**0**.5

M%**0**u+%ctur$**01** %s**2**ects #+ se&ecte, **0**ur%ceut$c%&s suc- %s &.c#**2**e**0**e> $s#+&%;#**0**#$,s> **2**re***$#t$cs %**0**, **2**r# ***$#t$cs> **1**&uc#s% **)** $**0**e> **2**-.t#ster&s etc5 F#r **)** u&%t$#**0** #+ +u**0**ct$#**0**%& +##,s c#**0**t%$**0**$**01** **0**utr%ceut$c%&s-st%***$&$t. %**0**, %**0**%&.t$c%& $ssues> &%*e&&$**01** $ssues5

SYLLAB

SYLLABDS FORM5 E5 (FOOD TECHNOLOGY)SECOND SEMESTER

FT (! Foo" Packaging Technology

B##"s Rec#)) e0 , e , :

65 ($0es> F5A5 : Fu0 , %) e0t%&s #+ (%c"%1$01> C#r0 -$&& (u*&$c%t$#0> L#0 , #05

25 D%;$,> C5R5 F D%;$,> D5R5D5 Ase2t$c (r#cess$01 %0 , (%c"%1$01 F F## ,> CRC (ress5

45 S%c -%r# ! F Gr$++$0 : F## , (%c"%1$01> A@I (u*&$s -$01> ' est2#rt> C#005

85 Br# , .> A5L5 : F&e3$*&e (%c"%1$01 #+ F## , s> CRC C

SECTION B

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SECTION A

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SECTION B

(s.c-r#)etr.> Des$10 #+ ,r.ers: I0tr#,uct$#0> t.2es #+ ,r$ers> ,es$10 c#0s$,er%t$#0 #+ ,r.ers5 Des$10 #+ 2&%te -e%t E3c-%01ers> e;%2#r%t#rs5

Des$10 #+)e)*r%0e se2%r%t$#0 u0$t (DF %0, RO)> -$1- 2ressure 2r#cess$01> 2u&se e&ectr$c +$e&, 2r#cess$015

Re+ere0ce B##"s

- George D. Saravacos A. E. Kostaropoulos. 2002. Handbook of food processing e uipment. Springer.
- Mahajani VV and Umarji SB. 200 . Joshi's Process E uipment Design. Macmillan India.
- Peters MS Timmerhaus KD and West RE. 2003. Plant Design and Economics for Chemical Engineers. McGraw-Hill Chemical Engineering Series.

SYLLAB

D0$t 8

Se0s#r. %0%&.s$s5Se0s#r. e;%&u%t$#0) et-#,s5 D$++ere0ce Test$01> Descr$2t$;e %0%&.s$s> A++ect$;e Test$015 A0%&.s$s #+ se0s#r. ,%t% $0 re&%t$#0 t# $0stru) e0t%& %0%&.s$s5 (re+ere0ce %0s %cce2t%0ce) %22$015

Re+ere0ce B##"s

65 E%r&e %0, E%r&e5 20065 Cre%t$01 Ne ! F##,s> C-%, ! $c" H#use Gr#u25
Fu&&er 20085 Ne ! +##, (r#,uct ,e;e&#2) e0t-+r#) c#0ce2t t#) %r"et 20tcSe$eR(5) 6.835:94439( )]TJR-294.72

65F18.44141c71(c) 2.85156(")]TJR256(")]TJR254

C ro ato rap y Introduction to chromatography principles classification of chromatographic techni ues thin layer and paper chromatography – principle and techni ue.

Column Chromatography – Factors affecting column efficiency and applications. Gas – li uid chromatography – theory instrumentation and applications. HPLC – instrumentation method column efficiency and applications.

er oana yt ca et ods Principle classification of methods.

TGA – Instrumentation factors affecting results and analysis of data. applications.

DTG – Instrumentation analysis of data and applications.

DTA – Principle Instrumentation and applications

SECTION-B

I pectroscopy Origin rigid rotor model harmonic oscillator model principle modes of vibrations of atoms in polyatomic molecules instrumentation selection rules identification of organic compounds on the basis of infrared spectra.

s pectroscopy Introduction laws of absorption origin of spectra types of transitions selection rules identification of organic compounds using UV-VIS spectroscopy.

NM Principle chemical shift spin-spin coupling shift reagents instrumentation

SYLLAB

B$#tec-0#&#1$c%& 2r#cess +#r +##, +#rt$+$c%t$#0› 2re*$#t$cs F #&$1#s%cc-%r$,es5 A22&$c%t$#0 #+ *$#tec-0#&#1. $0 !%ste tre%t)e0t #+ +##, $0,ustr$es5 l)2r#;e)e0t #+ 7u%&$t. #+ +##, *. *$#tec-0#&#1$c%& 2r#cesses5 B$#se0s#rs5

3e*erence)ooks›

1.

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C-e) $str. %0, *$#s.0t-es$s #+) $cr#*$%& 2r#,ucts e515 ;$t%) $0s> %) $0# %c$,s> e0A.) es> ster#$,s> %0t$*$#t$cs %0, 2#&.) ers5 Met%*#&$c re1u&%t$#0s $0 $0,ustr$%& +e) e0t%t$#05

M$cr#*$%& tr%0s+#r) %t$#0 #+ %&"%0es> %&"%&#$,s> ter2e0es> %r#) %t$c c#) 2#u0,s %0, 0%tur%&&. #ccurr$2#&.) ers5

M$cr#*$%& +##, 2r#u,ct$#05 S2#$&%1e) $cr##r1%0$s) s $0 +##,s %0, t-e$r c#0tr#&5 A22&$e, $#s0#31"h5(0) -4.60938(5) 2.4414[98286185742 2( ) 2.4414[989063(5( )039 -0.32742[4( )2.4414[9838( ))

Newtonian flow ' Effect of temperature ' Compositional factors affecting flow behaviour ' Viscosity of food dispersions – dilute and semi-dilute systems concentration effects.
Comparative assessment of different types of Viscometers and their Merits and Limitations Co-axial cylinders Spindle- or Impeller-type viscometers Cone-plate viscometer Capillary viscometers Falling-sphere viscometer Vibratory viscometers Extrusion viscometer Orifice viscometer.

SECT**/ - .)**

Rheology of semi-solid and solid food 'Rheological characterization of foods in terms of stress-strain relationship 'Viscoelasticity 'Transient tests - Creep Compliance and Stress Relaxation ' mechanical models for viscoelastic foods Maxwell Kelvin Burgers and generalized models and their application 'Dynamic measurement of viscoelasticity.
Large Deformations and failure in foods Definitions of fracture rupture and other related phenomena 'Texture Profile Analysis 'Instrumental measurements

SECT**/ - . $)**

H$**1- (**ressure **(**r#cess$**01**5 C#**0**ce**2**t› e**7**u$**2)** e**0**ts +#r H**((** tre%t **)** e**0**t› **)** ec**-**%**0**$s **)** +#r **)** $cr#*****$%& $**0**%ct$**;**%t$**#0 %0, $**trs %**22**&$c%t$**#0 $0 +##, 2**r#cess$**01**5 **D**&tr%s**#0**$c **2**r#cess$**01**5 **(**r#**2**ert$es #+ u&tr%s**#0**$c› %**22**&$c%t$**#0** #+ u&tr%s**#0**$c %s **2**r#cess$**01** tec**-0**$**7**ues5

I**00#;**%t$**;**e tec**-0**$**7**ues $**0 +##, 2**r#cess$**01**5 A**22**&$c%t$**#0 #+** tec**-0#**&**#1**$es **#+ -**$**1- $0**te**0**s$t**.** &$**1-**t› **2**u&se**,** e&ectr$c +$&e**,**› **#-)** $c **-**e%t$**01**› IR **-**e%t$**01**› $**0,**uct$**;**e **-**e%t$**01**› X-R%**.**s $**0 +##, 2**reser**;**%t$**#0**5 N%**0#** tec**-0#**&**#1.**: **2**r$**0**c$**2**&e %**0, %22**&$c%t$**#0 $0 +##,** s5

3e***erences **)**ooks

B%r***#**s%-C%**0#;**%s5 20025 N**#;**e& F**##, (**r#cess$**01** Tec**-0#**&**#1**$es› CRC **2**ress5

Mu**0**$rC**-**er**.%0**5 **6<=G**5 **D**&tr%+$&tr%t$**#0 -%0,** ***##"**5 Tec**-0#)** $c **2**u***&**$s**-**$**01**› L%**0**c%ster5

&! .anotechnology

?! Industrial Pollution Control and Abatement

SECT**/ - .**$**6**

Treatment Methods for water & waste › S**#**urces %**0,** c**-**%r%cter$A%t$**#0 #+ !** %ter **2#**&&ut$**#0**5

Primary Treatment: **1**r%**;**$t**.** se**2**%r%t#r› e**7**u%&$A%t$**#0** t%**0"**s› Se**,**$ **)** e**0**t%t$**#0**› F&#t%t$**#0**

Secondary Treatment **I** Des$**10 #+** : **D2+**&**# !** A**0**%rer***$c› S&u**,1**e B&%**0"**et (**D**SAB) re%ct#r› Act$**;**%te**,** S&u**,1**e **2**r#cess **I** R#t%t$**01** B$#&**#1**$c%& C**#0**t%ct#rs (RBC)› Tr$c**"**&$**01** F$&tersJ

Natural Treatment - **'** et&%**0,** S**.**ste **)** s› **'** %ste St%***$&$A%t$**#0 (#0,**s5

Tertiary Treatment systems: Ds**0+**ect$**#0** etc5

Sludge and solid wastes treatment: I**,**e**0**t$+$c%t$**#0 #+ -**%A%r**,#**us **!** %stes **I ,**$s**2#**s%& %**0, !** %ste **) 0) $**A%t$**#0› !** %ste **) %0%1**e **)** e**0**t›

SECT**/ - .**$**)**

Air Pollution Control