

SUBJECT CODE NO:- K-12
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E. (All Branches) Examination Oct/Nov 2016
Engineering Mathematics -IV
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Questions numbers 1 and 6 are compulsory.
 - ii. Solve any two questions from remaining of each section.
 - iii. Figures to the right indicate full marks.
 - iv. Assume suitable data, if necessary.

Section A

Q.1 Solve any five:-

10

- a) Find the analytic function $f(x) = u + iv$, whose imaginary part is $v = \sin hx \cos y$.
- b) Find the harmonic conjugate of $u = 4xy + x + 1$.
- c) Evaluate $\int_0^{1+\pi i} e^z dz$.
- d) Evaluate $\int_{0,1}^{(2,5)} (3x + y)dx + (2y - x)dy$, along $y = x^2 + 1$.
- e) Find the residue of $f(x) = \frac{1}{(z^2-1)^3}$ at each pole.
- f) Find the image of the circle $|Z| = 1$, under the transformation $W = \log z$.
- g) Solve $\frac{\partial^2 u}{\partial x^2} = 0$, where $u(0, y) = y^2$, and $u(l, y) = 1$.

OR

Find the z- transform of $K^z, K \geq 0$.

- h) Solve $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$, where $u(x, 0) = 4e^{-x}$.

OR

Find the z – transform of $f(K) = 4^K, K < 0$
 $= 3^K, K \geq 0$

Q.2

- a) If $u = a(1 + \cos\theta)$, find v so that $u + iv$ is analytic.
- b) Evaluate $\int_c \frac{(e^z \sin 2z - 1)}{z^2(z+2)^2} dz$ where c is $|z| = \frac{1}{2}$.
- c) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, subject condition $u(0, y) = 0, u(\pi, y) = 0, u(x, 0) = 100$ and $u(x, \infty) = 0$

OR

Find the z- transform of $\sin h \frac{K\pi}{2}$.

Q.3

- a) Show that $u = e^x \cos y + x^2 - y^2$ is harmonic. Find harmonic conjugate, also find corresponding analytic function.
- b) Evaluate $\int_c \frac{z+2}{z} dz$, where c is left half of the circle $|Z| = 2$.
- c) Solve $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$, subject to the conditions $y(0, t) = y(l, t) = 0, y(x, 0) = 0$ and $\left(\frac{\partial y}{\partial t}\right)_{t=0} = \lambda x(l - x)$.

OR

Find the inverse Z – transform of $\frac{z^2}{z^2+9}$

Q.4

- a) Find the image of the circle $|Z-3| = 5$ under the transform $W = \frac{1}{Z}$.
- b) Evaluate $\oint_C \frac{2Z+1}{Z^2-Z-2} dz$, where C is $|Z| = 3$, by Cauchy residue theorem.
- c) Solve $\alpha^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, with the boundary conditions $\frac{\partial u}{\partial x}(0, t) = 0, \frac{\partial u}{\partial x}(l, t) = 0$ and $u(x, 0) = Kx$.

OR

Solve $Y_{K+1} - Y_{K-1} = u(k), y(0) = 0$, by Z- transform.

Q.5

- a) Find the bilinear transformation which maps the points $Z=0, -i, 2i$ into the points $W= 5i, \infty, \frac{-i}{3}$ respectively.
- b) Expand $f(z) = \frac{z^2-1}{(z+2)(z+3)}$ in a Laurent's series for $2 < |Z| < 3$.
- c) Evaluate $\int_0^{2\pi} \frac{d\theta}{13+12\cos\theta}$, by residue theorem.

Section B

- Q.6 Solve any five:- 10
- Find the Laplace transform of $\frac{\sin 4t}{t}$.
 - Find the Laplace transform of $\left[\frac{d}{dt} (t^3 e^{-3t}) \right]$.
 - Find the Laplace transform of $[a \cos^2 2bt]$.
 - Find the inverse Laplace transform of $\frac{1}{s} \left(\frac{s-a}{s+a} \right)$.
 - Find the inverse Laplace transform of $\left[\frac{s}{(2s+1)^2} \right]$.
 - Find the inverse Laplace transform of $\frac{se^{-2s}}{s^2+25}$.
 - Find $f(x)$, if its Fourier sine transform is $e^{-a\lambda}$.
 - Find the Fourier transform of

$$f(x) = \begin{cases} 0, & \infty < x < a \\ = x, & a \leq x \leq b \\ = 0, & x > b \end{cases}$$
- Q.7 05
- Evaluate $\int_0^\infty \frac{e^{-t} \sin \sqrt{3t}}{t} dt$.
- Q.7 05
- Find the inverse Laplace transform of $\frac{1}{2s} \log \left(\frac{s^2+36}{s^2+16} \right)$.
- Q.7 05
- Solve $\frac{\partial u}{\partial t} = K \frac{\partial^2 u}{\partial x^2}$, subject to the conditions
 - $u=0$, when $x=0, t \geq 0$
 - $u = e^{-ax}$, when $t=0, x > 0$ and
 - $u(x, t)$ is bounded.
- Q.8 05
- Find the Laplace transform of $e^{4t} \int_0^t t \cos t dt$.
- Q.8 05
- Find inverse Laplace transform of $\frac{s}{s^4+8s^2+16}$ by convolution theorem.
- Q.8 05
- Find the Fourier sine transform of $\cos hx - \sin hx$.
- Q.9 05
- Find the Laplace transform of periodic function. $f(t) = \left(\frac{\pi+t}{2} \right)^2, 0 < t < 2\pi$ and $f(t) = f(t + 2\pi)$.
- Q.9 05
- Solve $\frac{d^2y}{dt^2} - 6 \frac{dy}{dt} + 9y = t^2, e^{3t}, y(0) = 2, y'(0) = 6$ by Laplace transform method.
- Q.9 05
- Solve the integral equation $\int_0^\infty f(x) \sin px dx = 1 - p, 0 \leq p \geq 1$
 $0, P > 1$
- Q.10 05
- Express the following function in terms of Heaviside unit step function and hence find their Laplace transform.

$$f(t) = \begin{cases} (t-a)^4, & t > a \\ = 0, & 0 < t < a \end{cases}$$
- Q.10 05
- Solve $\frac{dx}{dt} + y = 0, \frac{dy}{dt} - x = 0, x(0) = 1, y(0) = 0$
- Q.10 05
- Find the Fourier transform of $f(x)$, where

$$f(x) = \begin{cases} \cos x, & \text{if } 0 < x < 1 \\ = 0, & \text{Otherwise.} \end{cases}$$

SUBJECT CODE NO:- K-40
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Bio Tech) Examination Oct/Nov 2016
Cell Biology
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 & Q.No.6 B are compulsory from Section A & Section B respectively. Attempt any two questions from remaining four questions from each section.
 - ii) Figures to the right indicate full marks.
 - iii) Draw neat well labelled diagram wherever necessary.

Section A

- | | | |
|-----|---|----|
| Q.1 | Write short notes on any five. | 10 |
| | <ul style="list-style-type: none"> a) Zebra fish as cell model b) Archie bacteria & Eubacteria c) Prokaryotic cell structure d) Cell theory e) Haematopoiesis f) Nerve cell g) Properties of eukaryotic cell h) Multi cellular organism | |
| Q.2 | Explain in detail the principles of membrane transport. | 15 |
| Q.3 | Discuss the transmission of nerve impulse lighting the role of neurotransmitters. | 15 |
| Q.4 | Write detailed Notes on the role of various organelles in protein sorting. | 15 |
| Q.5 | How does oligo saccharide processing in golgi apparatus occur during vesicular transport? Explain in depth. | 15 |

Section – B

- | | | |
|------|---|----|
| Q.6 | Explain in brief any five | 10 |
| | <ul style="list-style-type: none"> 1) Restriction point in cell cycle 2) Cyclin dependent kinases 3) Spindle fibers 4) Prophase I of meiosis 5) Spermatogenesis 6) Synaptonemal complex 7) Cytokinesis 8) 'S' phase of interphase | |
| Q.7 | Write notes on different receptor classes and respective enabling modulus. | 15 |
| Q.8 | Explain in detail the action of secondary messengers. | 15 |
| Q.9 | Discuss the role of caspases in apoptosis. | 15 |
| Q.10 | Compare necrosis and apoptosis. | 15 |

SUBJECT CODE NO:- K-70
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Bio-Tech.) Examination Oct/Nov 2016
Bioinstrumentation
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 from section A and Q.No.6 from section B are compulsory.
 - ii) Attempt any two questions from the remaining four questions of each section.
 - iii) Figures to the right indicate full marks.

Section A

- | | | |
|-----|--|----------|
| Q.1 | Attempt any five | 10 |
| | <ul style="list-style-type: none">1. Spectroscopy2. m/e ratio3. Photo meter4. Isotope5. UV range6. Bathochromic shift7. Absorption8. Ions | |
| Q.2 | <ul style="list-style-type: none">a) Explain in detail various interactions of electromagnetic radiations and matter.b) Add a note on various transitions taking in UV spectroscopy. | 10
05 |
| Q.3 | Explain flame photometry with respect to | 15 |
| | <ul style="list-style-type: none">1. Principle2. Instrumentation (only diagram)3. Applications | |
| Q.4 | Add a note on | 15 |
| | <ul style="list-style-type: none">1. Grotrian diagram2. Deviation of Beer-Lamberts law3. Mass spectra | |
| Q.5 | <ul style="list-style-type: none">a) Draw the schematic diagram for mass spectra meterb) Add a note on various peaks produced in mass spectroscopy. | 05
10 |

Section B

- Q.6 Attempt any five 10
1. IR spectra
 2. Dipole
 3. Wagging
 4. Frequency
 5. Atomic number
 6. J
 7. Intensity
 8. NMR
- Q.7 a) Add a note on sampling techniques used in IR. 10
b) Enlist various applications of IR in detail. 05
- Q.8 Explain NMR with respect to following points. 15
1. Principle
 2. Instrument (only diagram)
 3. Spin-spin coupling
- Q.9 Which instrumental technique you would employ for determination of crystalline structure? Explain its principle and instrumentation. 15
- Q.10 Add notes on 15
1. Shielding
 2. Fracture determination
 3. Source used in IR

SUBJECT CODE NO:- K-100
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E. (Bio-Tech.) Examination Oct/Nov 2016
Metabolic Pathways & Regulation
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q No.1 and 6 are compulsory of each section.
 - ii) Attempt any Two questions from remaining four question from each section.
 - iii) Figures to the right indicate full marks.
 - iv) Draw neat and well labelled diagrams wherever necessary.

Section A

- Q.1 Answer any five of the following 10
- a) TCA cycle takes place in which location ?
 - b) How much energy is released in break down of last bond of ATP?
 - c) Glycolysis
 - d) Chemiosmotic ATP synthesis depends on?
 - e) The number of NADH molecules per glucose molecules taken electrons to the ETS.
 - f) Net gain of ATP in Glycolysis.
 - g) Catabolism.
 - h) The sum total of all the chemical reactions going on the cell is known as?
- Q.2 Explain EMP pathway and its steps involved it with regulation. 15
- Q.3 Explain role of insulin, epinephrine and glucagon in glucose metabolism. 15
- Q.4 a) Write a note on lactic acid fermentation. 08
b) ATP called as currency of energy in cell .Explain. 07
- Q.5 Write a note on.
- a) Regulation of citric acid cycle. 08
 - b) β oxidation 07

Section B

- Q.6 Answer any Five of the following 10
- a) How does urea cycle regulated.
 - b) metabolism.
 - c) HDL
 - d) What is the universal currency of energy
 - e) PKF
 - f) How many cycles of malongul COA addition to fatted acid ensures?
 - g) Non essential amino acids
 - h) Net gain of ATP in cell respiration.
- Q.7 Write a note on 08
- a) Biosynthesis of spingolipids. 07
 - b) Urea cycle.
- Q.8 a) Explain in brief electron carriers is electron Transport chain. 08
- b) What is unsaturated fatty acids? Give its biosynthesis. 07
- Q.9 Write the biosynthesis of purine and pyrimidines. 15
- Q10 Write a note on 08
- a) Catabolism and anabolism 07
 - b) Gluconeogenesis.

SUBJECT CODE NO:- K-185
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(ALL-BRANCHES) Examination Oct/Nov 2016
Engineering Mathematics - III
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q.No.1 and Q.No.6 are compulsory.
 - ii. Solve any two out of Q. 2, 3, 4 & 5.
 - iii. Solve any two out of Q. 7, 8, 9& 10.
 - iv. Use of Non-programmable calculator is allowed.
 - v. Figures to the right indicate full marks.
 - vi. Assume suitable data, if necessary.

Section A

Q.1 Solve any five

10

- a) Find C.F. of $\frac{d^2x}{dt^2} + 3a\frac{dx}{dt} - 4a^2x = 0$
- b) Solve $(D^3 - 3D^2 + 3D - 1)y = 0$
- c) Find P.I of $(D + 2)(D - 1)^2y = e^{-2x}$
- d) Find P.I of $(D^2 - 4)y = x^2$
- e) If the probability of a defective mobile phone is 0.2, find the
 - I. Mean
 - II. The standard deviation for the distribution of mobile phones in a total of 200.
- f) Suppose 3% of bolts made by machine are defective the defects occurring at random during production if bolts are packaged 50 per box find Poisson approximation to it that a given box will contain 5 defectives.
- g) There is no skewness in the distribution if -----.
- h) Draw the electrical circuit that gives damped free oscillations.

Q.2

- a) Solve $(D^2 + 13D + 36)y = e^{-4x} + \cos 2x$
- b) Find the Karl Pearson's coefficient of skewness for the following

05

05

Years under	10	20	30	40	50	60
No. of persons	15	32	51	78	97	109

- c) An alternating $emf E \sin \omega t$ is applied to an inductance L and capacitance C in series. Show that ,the current in the circuit is $\frac{EW}{(n^2-w^2)L} (\cos wt - \cos nt)$ where $\eta^2 = \frac{1}{LC}$

05

Q.3

- a) Solve by method of variation of parameters. $(D^2 + 2D + 1)y = 4e^{-x} \log x$
- b) Apply the method of the least squares to fit a parabola $y = a + bx + cx^2$ for the data.

05

05

X	-1	0	0	1
Y	2	0	1	2

- c) Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \sin(\log x^2)$

05

- Q.4 a) An underground mine has 5 pumps installed for pumping out storm water. The probability of any one of the pumps failing during the storm is $\frac{1}{8}$. what is the probability that
- At least 2 pumps will be working
 - All pumps will be working during a particular storm.
- b) A body executes damped forced vibrations given by the equation $\frac{d^2x}{dt^2} + 2K \frac{dx}{dt} + b^2x = e^{-kt} \sin wt$. solve the equation for both the cases, when $w^2 \neq b^2 - k^2$ and $w^2 = b^2 - k^2$.
- c) Solve $(2x + 1) \frac{d^2y}{dx^2} - \frac{dy}{dx} + \frac{y}{2x+1} = \frac{3x+4}{2x+1}$

- Q.5 a) The first four moments of a distribution about the value 4 of the variable are $-1.5, 17, -30$ and 108 . Calculate the first four moments about the mean and find β_1 and β_2 .
- b) Solve the equation $EI \frac{d^2y}{dx^2} + Py = \frac{-wl^2}{8} \sin\left(\frac{\pi x}{l}\right)$ for a strut of length 'l' freely hinged at each end. Prove that the deflection y at the centre is $\frac{wl^2}{8(Q-P)}$ where $Q = \frac{EI\pi^2}{l^2}$
- c) Solve by general method $(D^2 + 3D + 2)y = e^{e^x}$

Section – B

Q.6 Solve any five

- Find the first approximate value of the root (ie. x_1) by Newton – Raphson method for $\log_e x - x + 3 = 0$.
- Find the values of x, y, z in the first iteration by Gauss Seidel Method for

$$8x + 3y + 2z = 13$$

$$x + 5y + z = 7$$

$$2x + y + 6z = 9$$
- Find f(1) for data

X	0	2	3
F(x)	-4	2	14

- Find grad ϕ at $(1,1,-1)$ if $\phi = e^{2x-y+z}$.
- Prove that $\vec{F} = (y^2 \cos x + z^3)i + (2y \sin x - 4)j + (3xz^2 + 2)k$ is conservation field.
- If $\vec{A}(t) = ti - t^2j + (t - 1)k$
 $\vec{B}(t) = 2t^2i + 6tk$
 Evaluate $\int_0^2 \vec{A} \cdot \vec{B} dt$.
- If $\vec{r} = xi + yj + zk$ then find $\nabla \cdot \vec{r}$.
- Write formula of Runge Kutta IVth order method to solve $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$

- Q.7 a) Find the root of the equation $e^{-x} - x = 0$ by Newton –Raphson method (correct to three decimal places).
- b) Find the directional derivation of $\phi = xy^2 + yz^3$ at the point $(2,-1, 1)$ in the direction of the normal to the surface $x \log z - y^2 = -4$ at $(-1,2,1)$.
- c) If $\vec{F} = (5xy - 6x^2)i + (2y - 4x)j$, evaluate $\int_C \vec{F} \cdot d\vec{r}$ along the curve C in $x - y$ plane, $y = x^3$ from the point $(1, 1)$ to $(2, 8)$.

- Q.8 a) Solve by Gauss Seidel method
- $$28x + 4y - z = 32$$
- $$x + 3y + 10z = 24$$
- $$2x + 17y + 4z = 35$$

- b) Verify Green's theorem for $\vec{F} = x^2i + xyj$ and C is a triangle having vertices A (0, 2), B (2, 0) and C (4, 2). 05
 c) Find $\nabla^4(e^r)$. 05

- Q.9 a) Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ and $y(1)=1$ find approximate value of y at $x = 1.2$ using Euler's modified method (take $h = 0.2$) 05
 b) Use Lagrange's interpolation to find the value of y when $x=10$ for the data given below. 05

X:	5	6	9	11
Y:	12	13	14	16

- c) Using stoke's theorem evaluate $\int_C [(x + y) + (2x - z)dy + (y + z)dz]$ where C is the boundary of the triangle with vertices (2,0,0) (0,3,0) and (0,0,6). 05

- Q.10 a) Evaluate $\int_C \vec{F} \cdot d\vec{s}$ where $\vec{F} = yi + xj + z^2k$ over the cylindrical region bounded by $x^2 + y^2 = 9, z = 0$ and $z = 2$. 05
 b) From the following table find the value of $\frac{dy}{dx}$ at $x = 2.03$. 05

X:	1.96	1.98	2.00	2.02	2.04
Y:	0.7825	0.7739	0.7651	0.7563	0.7473

- c) Use fourth order Runge Kutta method to find y at $x = 0.1$ given that $\frac{dy}{dx} = 3e^x + 2y, y(0) = 0$ and $h = 0.1$. 05

SUBJECT CODE NO:- K-315
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(BIO-TECH.) Examination Oct/Nov 2016
Microbiology
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 from section A and Q.No.6 from section B are compulsory.
 - ii) Attempt any two questions from the remaining four questions of each section.
 - iii) Figures to the right indicate full marks.
 - iv) Draw neat and well-labelled diagram.

Section A

- | | | |
|-----|--|----|
| Q.1 | Attempt (any five) from the following. | 10 |
| | i) Microscope. | |
| | ii) Pathogens. | |
| | iii) Pure culture. | |
| | iv) Fixation. | |
| | v) Anaerobes. | |
| | vi) Synchronous culture. | |
| | vii) Enrichment. | |
| | viii) Any two selective media. | |
| | ix) Any two sporulating microorganisms. | |
| | x) Function of flagella. | |
| Q.2 | a) Explain Whitaker's five kingdom classification. | 08 |
| | b) Discuss important contributions made by scientists in microbiology. | 07 |
| Q.3 | a) Discuss methods for isolation of bacteria. | 08 |
| | b) Give the principle and application of dark-field microscopy. | 07 |
| Q.4 | a) Discuss the media used for cultivation of anaerobes. | 08 |
| | b) What are the different types of enrichment medium? | 07 |
| Q.5 | a) Mention Koch's postulates. | 05 |
| | b) Structure of microbial cell. | 05 |
| | c) Give general characteristics of algae. | 05 |

Section B

- Q.6 Attempt (any five) from the following 10
- a) Inclusion bodies.
 - b) Shapes of bacteria.
 - c) Fimbriae.
 - d) Transformation.
 - e) Lytic phage.
 - f) Causative agent of AIDS.
 - g) Any two gram positive microorganisms.
 - h) Any two beneficial microorganisms.
 - i) Any two economically important algae.
 - j) Resolving power.
- Q.7 a) Discuss the mechanism of conjugation. 08
b) What is generalized transduction? 07
- Q.8 a) Elaborate the steps of lysogenic cycle. 08
b) Give the structure and features of HIV. 07
- Q.9 a) Explain the process of asexual reproduction in fungi. 08
b) Discuss nutritional requirement of fungi. 07
- Q.10 a) Discuss the mechanism of Gram staining technique. 05
b) Discuss diseases caused by viruses in plants. 05
c) Give major characteristics of fungi. 05

SUBJECT CODE NO:- K-217
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(BIO-TECH.) Examination Oct/Nov 2016
Molecular Biology
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Question no.1 and 6 are compulsory of each section.
 - ii) Attempt any two questions from the remaining four questions from each section.
 - iii) Figures to right indicate full marks.
 - iv) Draw neat & well labelled diagram where necessary.

Section A

- Q.1 Attempt any five 10
- 1) Topoisomerase.
 - 2) Write about ori C.
 - 3) Suppressor mutation.
 - 4) Write the chromosome.
 - 5) SOS.
 - 6) The enzyme responsible for repair in DNA replication.
 - 7) Mutagens means what & write any example.
 - 8) Name the enzyme that unwinds DNA.
- Q.2 a) Explain mismatch repair & write in short mismatch repair in E coli diagrammatically. 07
b) How does post replication repair takes place. 08
- Q.3 Write down the initiation, elongation & termination of eukaryotic DNA replication. 15
- Q.4 Write a note on 08
- 1) Acridine & nitrous acid 07
 - 2) Nucleosome
- Q.5 Explain the chromosome sequence & their diversity. 15

Section B

- Q.6 Attempt any five 10
- 1) G-capping
 - 2) SL-1 means what & write its function
 - 3) Define Radio labelling
 - 4) Write the stop codons
 - 5) TATA Box
 - 6) Role of E site
 - 7) σ (sigma) factor
 - 8) UCE
- Q.7 Write down the detail process of translation in both prokaryotes & eukaryotes 15

- Q.8 a) Write down the role of Pol III in transcription. 08
b) Write the initiation of transcription in prokaryotes. 07
- Q.9 a) Write the principle of Gel electrophoresis & write a note on pulse field gel electrophoresis 08
b) How fluorescence detection is used of nucleic acid with one chemical method. 07
- Q.10 a) Add a note on splicing 08
b) Structure & function of t RNA. 07

SUBJECT CODE NO:- K-248
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(BIO-TECH.) Examination Oct/Nov 2016
Process Calculations
(Revised)

[Time:Three Hours]

[Max. Marks:80]

- N.B
- Please check whether you have got the right question paper.
- I. Q.No.1 and 6 are compulsory.
 - II. Answer any two questions from remaining of each section.
 - III. Assume suitable data, if required and draw neat sketches wherever needed.

Section A

- Q.1 Explain following terms. (Any five) 10
- 1) Fundamental quantity.
 - 2) Equivalent mass.
 - 3) Boyles law.
 - 4) Unsteady state.
 - 5) Limiting reactant.
 - 6) Selectivity.
- Q.2 a) A force equal to 192.6N is applied on a piston with a diameter of 5cm. Find the pressure exerted on the piston in KPa, bar and psi. 07
- b) Analysis of magnesite ore obtained from chalk Hill area yields 81% MgCO₃, 14% SiO₂, and 5% H₂O by Wt. Convert analysis into Mole %. 08
- Q.3 For carrying out Nitration reaction it is desired to have mixed acid contains 39% HNO₃ 42% H₂SO₄ by Wt. Nitric Acid 68.3% calculate 15
- a) Required strength of H₂SO₄ to obtain above mixed acid
 - b) Wt. Ration of nitric acid to sulphuric acid to be mixed
- Q.4 In Deacon Process for Mfg. Of chlorine a dry mix of HCL gas is oxidized with air. If air is used in excess of 30% of 15 that theoretically required and if the oxidation 80% is complete, calculate composition by volume of dry gases leaving the reaction chamber 15
- 4 HCL + O₂ = 2Cl₂ + 2H₂O
- Q.5 Write short note on. 15
- a) Bypass operation.
 - b) Material balance with chemical reaction.
 - c) Electrochemical reaction.

Section B

- Q.6 Explain following terms. 03
- 1) Sensible heat and heat of sublimation. 03
 - 2) Hess's law of heat summation. 04
 - 3) Energy balancing at steady state condition 03
- Q.7 Calculate the theoretical flame temperature of a gas having 20% CO and 80% N₂ when burnt with 150% excess air. Both the reactants are at 25°C. 15
- Data:
- ΔH_f° of CO₂ = -94052 cal /gmol
- ΔH_f° of CO = -26412 cal/gmol
- Mean heat capacities in cal/gmol. °C are CO₂ = 12, O₂ = 7.9, N₂ = 7.55
- Q.8 The analysis of 15000 litre of gas mixture at standard conditions is as follows. 15
- CO₂ = 9.5%; SO₂ = 0.5%; O₂ = 12.0%; N₂ = 78.0%

How much heat must be added to this gas to change its temperature from 25°C to 700°C?

Data: specific heat values in kcal/ (kmol. °K)

Gas	CO ₂	SO ₂	O ₂	N ₂
C _p at 25°C	8.884	9.54	7.017	6.961
C _p at 700°C	11.303	11.66	7.706	7.298

- Q.9 A continuous distillation column is used to regenerate solvent for use in a solvent extraction unit. The column treats 200kmol/hr or a feed containing 10 mol % ethyl alcohol and the rest water. The overhead product is 89 mol % alcohol and the bottom product is 0.3 mol % alcohol. The overhead is sent to the extraction unit and bottom is waster. What is the daily requirement of make-up alcohol in the solvent extraction unit? 15
- Q.10 Write short note on. 15
- I. Heat capacity of liquid mixtures.
 - II. Material balancing in crystallization.
 - III. Types of fuels and their calorific values.

SUBJECT CODE NO:- K-281
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(BIO-TECH.) Examination Oct/Nov 2016
Biochemistry
(Revised)

[Time: Three Hours]

[Max. Marks:80]

- N.B Please check whether you have got the right question paper.
- i. Question no. 1 from section A & question no. 6 from section B are compulsory.
 - ii. Attempt any two questions from the remaining four questions from each section.
 - iii. Draw neat and well labelled diagram wherever required.
 - iv. Figures to the right indicate full marks.

Section A

- | | | |
|-----|--|----------|
| Q.1 | Explain the following terms (<u>any 5</u>) | 10 |
| | <ol style="list-style-type: none"> 1) Bond energy. 2) Diffusion. 3) Biological buffer system. 4) Enlist any four applications of carbohydrates. 5) Draw the structure of lactose. 6) Micelle. 7) Lipids. 8) Acid value for lipids. | |
| Q.2 | <ol style="list-style-type: none"> a) Explain the physical and chemical properties of water. b) Explain the formation of an ionic bond with suitable example. | 10
05 |
| Q.3 | <ol style="list-style-type: none"> a) Add a note on monosaccharides. b) Explain the chemical reactions of carbohydrates. | 10
05 |
| Q.4 | <ol style="list-style-type: none"> a) Distinguish between fats & oils. b) Applications of lipids. | 08
07 |
| Q.5 | Add notes on (<u>any 3</u>): <ol style="list-style-type: none"> 1. Concept of acid & base. 2. Hetero polysaccharides. 3. Structural composition of lipids. 4. Universal solvent. | 15 |

Section B

- | | | |
|-----|--|----|
| Q.6 | Explain the following terms (<u>any 5</u>) | 10 |
| | <ol style="list-style-type: none"> 1. Nucleoside. 2. RNA. 3. Hydrogen bond. 4. Coenzyme. 5. Vitamins. 6. NAD & FAD. 7. Amino acid. 8. Peptide. | |

- Q.7 a) Explain the Watson and crick model of DNA. 10
b) Does DNA absorb UV radiations? If so justify your answer. 05
- Q.8 a) Write in detail various nutritional disorders caused by hypervitaminosis and hypovitaminosis. 10
b) Add note on vitamin B₁ & B₆ 05
- Q.9 a) What do you understand by amino acid? Give its general formula. Classify them on the basis of charge and polarity. 10
b) Biological role of peptides. Explain. 05
- Q.10 Write short note on (any 3): 15
1. Functions of nucleic acid.
 2. Protein conformation.
 3. Function of vitamins.
 4. Different bonds present in DNA structure.

SUBJECT CODE NO:- K-167
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(BIO-TECH.) Examination Oct/Nov 2016
Momentum & Heat Transfer
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Q.No.1 and Q.No.6 are compulsory.
- ii) Answer any two questions from the remaining in each section.
- iii) Assume suitable data wherever necessary.

Section A

- | | | |
|-----|--|----------|
| Q.1 | Define /explain
a) Buoyancy
b) Skin friction
c) Suction lift
d) Agitation
e) Surface tension | 10 |
| Q.2 | a) State and prove Pascal's law
b) What is monometer? How they are classified? | 07
08 |
| Q.3 | a) Explain the shear stress distribution for flow of incompressible fluid in a cylindrical tube.
b) A pipeline carrying all of specific gravity 0.87 changes in diameter from 200mm diameter at position A to 500mm diameter at position B which is 4 meter at higher level. If the pressure at A and B are 9.81m/cm^2 and 5.88N/cm^2 respectively. And discharge is 200 lit/see. Determine loss of head and direction of flow. | 08
07 |
| Q.4 | a) Explain in detail kinetic energy correction factor.
b) What is NPSH and how it is calculated? | 07
08 |
| Q.5 | Write note on
a) Centrifugal pump
b) Agitation and mixing of liquids
c) Application of basic equations of fluid flow to Bio processes. | 15 |

Section B

- | | | |
|-----|---|----|
| Q.6 | Answer in brief
a) What do you understand by heat transfer coefficient? Give its units.
b) Explain the mechanism of conduction.
c) Give any two application of Fin.
d) What is insulation?
e) Explain the mechanism of convection. | 10 |
|-----|---|----|

- Q.7 a) Prove that heat loss per square meter of outside surface area of hollow sphere heated from within is equal to 08
- $$q = \frac{K(T_1 - T_2)}{(D_2 - D_1) \frac{D_2}{D_1}}$$
- Where T_1 and T_2 are the temperature and D_1 and D_2 are the diameter of the inner and outer surface respectively.
- b) A wall of a steam boiler furnace is made of layer of fire clay of thickness. 12.5 cm [k₁=(0.28 to 0.00023T)w|m-c] and red brick of 50cm (k₂=0.7 w|m-c) where T is a degree Celsius. The inside surface temperature of fire clay is 1100^oc and outside red brick wall temperature 50^oc. Calculate the amount of heat loss per square meter area at the furnace wall and temperature at the interface. 07
- Q.8 a) Explain Reynolds Analogy between heat transfer and momentum transfer. 10
b) Explain in brief Kickoff's law. 05
- Q.9 a) Explain in detail Pool boiling. 07
b) State and explain Fourier law of heat conduction. 08
- Q.10 Write note on 15
a) Black body
b) Optimum and economic thickness of insulation
c) Natural convention