

Roll No.

TMA-201

B. TECH. (SECOND SEMESTER) END SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

ENGINEERING MATHEMATICS-II

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains five questions and all questions are compulsory.

- (ii) Attempt any two parts from each question.
(iii) All questions carry equal marks.

1. Attempt any two questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Define linear differential equation. Solve :

$$(D^2 + 2)y = e^x \cos x + x^2 e^{2x}.$$

(b) Use method of Variation of parameter to solve :

$$\frac{d^2y}{dx^2} + y = \operatorname{cosec} x.$$

(2)

TMA-201

(c) Solve :

$$\frac{d^4y}{dx^4} - y = \cos x \cosh x.$$

2. Attempt any two questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) State Convolution Theorem and use it to evaluate :

$$L^{-1} \left[\frac{s^2}{(s^2 + a^2)^2} \right].$$

(b) Using Laplace transformation, solve the differential equation :

$$(D^2 + 9)y = \cos 2x, \text{ if } y(0) = 1, y\left(\frac{\pi}{2}\right) = -1.$$

(c) Find the Laplace transform of the following periodic function :

$F(t) = t/T, 0 < t < T$ (saw-tooth wave of period T).

3. Attempt any two questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Define partial differential equations.

Solve :

$$4r - 4s + t = 16 \log(x + 2y).$$

(3)

TMA-201

(b) Solve by the method of separation of variables :

$$\frac{\partial u}{\partial x} = 5 \frac{\partial u}{\partial t} + u, \text{ where } u(x, 0) = 6e^{-3x}.$$

(c) Solve the partial differential equation :

$$\frac{\partial^2 z}{\partial x^2} + 3 \frac{\partial^2 z}{\partial x \partial y} + 2 \frac{\partial^2 z}{\partial y^2} = (x + y).$$

4. Attempt any two questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Find the Half Range Fourier cosine series of :

$$f(x) = |\cos x|, 0 < x < \pi.$$

(b) Obtain Fourier series for the function :

$$f(x) = \begin{cases} 1+x, & -\pi < x < 0 \\ 1-x, & 0 < x < \pi \end{cases}$$

(c) Find the Fourier series expansion for the function :

$$f(x) = \frac{(\pi - x)^2}{4}, 0 < x < 2\pi.$$

5. Attempt any *two* questions of choice from (a),
 (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Define Bessel's differential equation.

Show that :

$$\frac{d}{dx} \left\{ x^n J_n(x) \right\} = x^n J_{n-1}(x).$$

(b) Determine the solution of one dimensional

heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$, subject to the

boundary conditions $u(0, t) = 0$, $u(l, t) = 0$

$(t > 0)$ and initial condition $u(x, 0) = x$, l
 being the length of the bar.

(c) Prove that :

$$\int_{-1}^1 [P_n(x)]^2 dx = \frac{2}{2n+1}.$$

Roll No.

TMA-202

B. TECH. (SECOND SEMESTER) END SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

PROBABILITY AND DIFFERENTIAL
EQUATIONS

Time : Three Hours

Maximum Marks : 100

- Note : (i) This question paper contains five questions and all questions are compulsory.
(ii) Attempt any two parts from each question.
(iii) Each question carries equal marks.

1. Attempt any two questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$

- (a) Define Linear differential equation.
Solve :

$$(D^2 - 4D + 3)y = e^x \cos 2x + x^2 e^x.$$

- (b) Use method of variation of parameter to solve :

$$\frac{d^2y}{dx^2} + y = \sin x.$$

(2)

TMA-202

(c) Solve given differential equation :

$$x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x + \log x.$$

2. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) State Convolution Theorem. Using Convolution theorem evaluate :

$$L^{-1} \left[\frac{s}{(s^2 + 1)(s^2 + 4)} \right].$$

(b) Solve the differential equation $\frac{d^2y}{dx^2} + 25y = 10 \cos 5x$, under the condition $y(0) = 2$, $y'(0) = 0$ by using Laplace transform.

(c) Find the Laplace transform for the following functions :

$$(i) F(t) = \frac{e^{at} - \cos bt}{t}$$

$$(ii) F(t) = \frac{e^{-1} \sin t}{t}$$

(3)

TMA-202

3. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

- (a) Define binomial probability distribution. Ten coins are thrown simultaneously. Using binomial distribution find the probability of getting at least seven heads.
- (b) If X is a poisson variate such that $P(X=2) = 9 P(X=4) + 90 P(X=6)$. Find λ (the mean of X).
- (c) Find the expectation and variance of the random variable X , whose p. d. f. is given by :

$$f(x) = \begin{cases} 2e^{-2x} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$$

Also find $E(3X^2 - 2X)$.

4. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

- (a) Define probability mass function and probability density function. Check whether $f(x) = 6x(1-x)$, $0 \leq x \leq 1$ is a probability density function. Also find the cumulative distribution function.

(4)

TMA-202

- (b) Two search radar beams from two different installations cover the same area of the sky.

Both installation scan the area at the same rate but because of the difference in the transmitter, receiver and antenna design, the first radar can detect a target which is there 85% of the time while the second only 75% of the time. If a target is detected by the first radar.

- (c) Four cards are drawn at random from a well shuffled pack of cards.

Find the probability that :

- (i) All four are queen
- (ii) There are is one card from each suit
- (iii) Two card are diamond and two are spade
- (iv) All the four card are heart and one of them is a jack

5. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

- (a) In Miss India contest ten competitors are ranked by three judges in the given table.

(5)

TMA-202

Use the correlation coefficient to determine which pair judge has the nearest approach to common perception in beauty.

1st Judge	2nd Judge	3rd Judge
5	1	6
3	6	4
10	5	9
7	10	8
2	3	1
1	2	2
4	4	3
10	9	10
4	7	5
6	8	7

- (b) Calculate the moment coefficient of Skewness of the following distribution :

Marks	Number of students
0—10	8
10—20	12
20—30	20
30—40	30
40—50	15
50—60	10

(6)

TMA-202

- (c) A study of prices of a certain commodity at Hapur and Kanpur yields the following data :

	Hapur (x)	Kanpur (y)
Average price per kg	2.463	2.797
Standard deviation	0.326	0.207
Correlation coefficient	0.774	

Construct the line of regression and estimate the corresponding price of rupees 3.052 per kg at Kanpur.

Roll No.

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Paper Code:TCS201

End Semester Examination 2019

IIInd Semester

Programming for Problem solving

Time: Three Hours

MM: 100

Note:

- (i) All questions are compulsory.
- (ii) Answer any two sub questions among a, b & c in each main question

Que1: a) What is recursion? Explain with an example and step by step stack representation.
b) Draw a flowchart to pass an array of n integer numbers to a function and count number of positive, negative and zeros.
c) Write a menu driven C program to implement following functions based upon the given inputs.
1. Addition of two integers
2. Square of an integer number
3. Largest of two integer's number
4. Exit

Que2: a) Differentiate between string and character array. Explain 5 pre define function of string handling function with suitable syntax and example.
b) Draw a flowchart to input a string and arrange that in alphabetical order.
Sample Input: thankyou
Sample Output: ahknotuy
c) Write a C program to input two strings using dynamic memory allocation and concatenate these two strings.

Que3: a) Write short notes on following:

- 1) Self referential structure
 - 2) bit-field
- b) Write an algorithm to input an array using pointer and replace all the numbers by their cube.
c) Create a structure Train_info with the data members tarin_no (int type), train_name(char type), departure_station(char type), arrival_station(char type), departure_time(int type), arrival_time(int type). Time should having two fields for hour and minute. Write a C program to input details of n trains and display details of the trains which are travelling between any two stations inputted by user.

Que4: a) What is the need of file? Explain various functions of file handling by which we can achieve random accessing of file.
b) Write an algorithm to input a paragraph in a file and print all three letters words on the screen.
c) Write a C program to write n integer numbers into a file named INDATA. Then read the numbers from the file and write factorial of each number into another file named OUTDATA.

Que5: a) What is the difference between list and tuples? Explain with an example.
b) Write a python program that take a numbers as input from user and print sum of digit of that number.
c) Write a python program that create a list for all the numbers in a given limit and indicate weather number is perfect or not.

22-5-19 (1:30 to 4:30)

Roll No.

THU-201

B. Tech. (SECOND SEMESTER)

END SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

ADVANCED PROFESSIONAL

COMMUNICATION

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub questions in
each main question.

(iii) Total marks for each main question
is twenty.

1. Attempt any *two* parts of choice from (a), (b)
and (c). $(10 \times 2 = 20 \text{ Marks})$

(a) Explain the advantages and disadvantages
of business communication. $(CO5)$

(b) Write the meaning of the following
phrasal verbs : $(CO3)$

(i) Call off

(2)

THU-201

- (ii) Look after
(iii) Stand by
(iv) Cast off
(v) Set for
(vi) Put down
(vii) Do over
(viii) Hold back
(ix) Make out
(x) Turn down
- (c) Write a paragraph on 'Books are better than Internet' (200 words). (CO2)
2. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- (a) Explain in detail *five* types of Interviews. (CO4)
- (b) Use the following idioms in sentences to clarify the meaning : (CO3)
- (i) A burning question
(ii) A wild goose chase
(iii) A fair weather friend
(iv) To read between lines
(v) Scapegoat

(3)

THU-201

- (vi) Break a leg
(vii) Old flames die hard
(viii) Grease the palm
(ix) Bone of contention
(x) Selling like hot cake
- (c) Write a job application and a CV to apply for the post of Graduate Engineer Trainee in Tata Motors. (CO5)
3. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- (a) Explain the importance of audience awareness, locale and audio-visual aids for an effective presentation. (CO5)
- (b) Identify the non-finite verb of the italicized word : (CO1)
- (i) Help me *catch* this fish.
(ii) You had better *finish* your work by then.
(iii) The *injured* man was waiting for the doctor.
(iv) I denied *accepting* the proposal.

- (v) I always go for a walk after *eating* dinner.
- (vi) The *napping* dog caused a delay.
- (vii) *Speaking* in class is what he does best.
- (viii) The fire truck, *blaring* its siren, sped down the road.
- (ix) The *napping* dog caused a delay.
- (x) *Leaving* home can be very traumatic.
- (c) Explain the Do's and Don'ts of a group discussion. (CO4)

4. Attempt any *two* parts of choice, from (a), (b) and (c). (10×2=20 Marks)

- (a) Write an essay on "Negative and positive long-term effects of living in a technological world." (300 words) (CO2)
- (b) Choose the correct form of the verb that agrees with the subject : (CO1)
- (i) Annie and her brothers _____ (is, are) at school.

- (ii) Either my mother or my father _____ (is, are) coming to the meeting.
- (iii) The dog or the cats _____ (is, are) outside.
- (iv) Either my shoes or your coat _____ (is, are) always on the floor.
- (v) George and Jim _____ (doesn't, don't) want to see that movie.
- (vi) John _____ (doesn't, don't) know the answer.
- (vii) The players, as well as the captain, _____ (want, wants) to win.
- (viii) Either answer _____ (is, are) acceptable.
- (ix) Every one of those books _____ (is, are) fiction.
- (x) The man with all the birds _____ (live, lives) on my street.

(6)

THU-201

- (c) Explain in detail the principles of business correspondence. (CO5)
5. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- (a) Explain the Do's and Don'ts to be followed for a successful Interview. (CO4)
- (b) Change the speech of the following sentences : (CO1)
- (i) David said, "I am writing a letter now."
- (ii) Antony says, "I eat a mango."
- (iii) They said, "Sir, the time is over."
- (iv) She said, "I visited Oxford University yesterday."
- (v) He said, "I have been studying since 3 o'clock."
- (vi) John said, "They went to cinema."
- (vii) I said, "I will not take the exam."

(7)

THU-201

- (viii) The teacher said, "Columbus discovered America in 1942."
- (ix) I said, "If I were the President I would build a new building."
- (x) The teacher said to student, "do not waste time."
- (c) Discuss the guidelines to be followed for an effective extempore speech. (CO4)

THU-201

800

Roll No.

TCH-201

B. TECH. (SECOND SEMESTER) END SEMESTER EXAMINATION, 2019

(ALL BRANCHES) ENGINEERING CHEMISTRY

Time : Three Hours

Maximum Marks : 100

- Note :** (i) All questions are compulsory.
(ii) Answer any two sub questions in each main question.
(iii) Total marks for each main question are twenty.
1. Attempt any two questions of choice from (a), (b) and (c). ($2 \times 10 = 20$ Marks)
- (a) Explain the characteristic of good fuel.
Write a short note on cracking and knocking in petrol.
- (b) A sample of coal containing 89% C, 8% H and 3% ash. When this coal was tested in

(2)

TCH-201

the laboratory for its calorific value in the Bomb Calorimeter, the following data was obtained :

Weight of coal burnt = 0.85 g

Weight of water = 650 g

Water equivalent of bomb

calorimeter = 2500 g

Rise in temp = 2.5°C

Cooling correction = 0.03°C

Fuse wire correction = 10 calories

Acid correction = 50 calories

Assuming the latent heat of condensation of steam = 580 cal/g

Calculate the GCV and LCV of coal in cal/g.

- (c) Differentiate between conventional and non-conventional energy sources. What do you understand by biogas or bioenergy ? Explain with one example.
2. Attempt any two questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Derive the Nernst equation and write the applications of Nernst equation.

(3)

TCH-201

- (b) Differentiate between electrochemical cell and electrolytic cell.

Calculate the standard EMF of the following cell at 25°C; writing its half cell reaction and net cell reaction : $Zn|ZnSO_4$ || $CuSO_4|Cu$. Standard potentials of Cu and Zn electrodes are + 0.34 and - 0.76 V respectively.

- (c) Explain the phenomenon of corrosion with the help of chemical reaction. Differentiate between dry and wet corrosion.

3. Attempt any two questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) What is the chemical shift of the resonance from TMS of a group of nuclei with $\delta = 3.50$ and an operating frequency of 350 MHz ? Differentiate between UV-Vis and IR spectroscopy.

(b) Explain the three regions of IR spectra and enumerate electrons transition of UV-VIS spectroscopy.

(c) Discuss on the use of NMR spectroscopy in structural determination of an organic

(4)

TCH-201

compound. How many proton signals and singlets are expected in the NMR spectra of :

- (i) $\text{ClCH}_2\text{CH}_2\text{Cl}$
- (ii) CH_3COCH_3
- (iii) $\text{CH}_3\text{COOCH}_3$

4. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Enumerate the difference between S_N1 and S_N2 reactions. Illustrate the stereochemical implication of S_N1 and S_N2 reactions with respect to ter-butyl bromide.

(b) What are activating and deactivating substituents and give appropriate examples. Why all m-directors are deactivating and most o, p directing substituent are activating ? Classify the following groups as o, p or m directing in an aromatic halogenations reaction :

- (i) $-\text{NH}_3$
- (ii) $-\text{NO}_2$
- (iii) $-\text{Cl}$
- (iv) $-\text{OH}$
- (v) $-\text{CH}_3$

(c) Write about two drugs synthesis and their application.

(5)

TCH-201

5. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$

(a) Differentiate between Inter-molecular and Intra-molecular hydrogen bonding. Explain the structure of XeF_4 and SO_2 with the help of VSEPR theory.

(b) Explain the principle of lime-soda process for the treatment of hard water along with appropriate chemical equations.

A sample of water is found to contain the following dissolved salts : $\text{Mg}(\text{HCO}_3)_2 = 36.5 \text{ ppm}$, $\text{CaCl}_2 = 27.75 \text{ ppm}$, $\text{Ca}(\text{HCO}_3)_2 = 40.5 \text{ ppm}$, $\text{MgSO}_4 = 30 \text{ ppm}$ and $\text{CaSO}_4 = 34.0 \text{ ppm}$. Calculate the amount of lime and soda required to treat 20,000 L of the water (Atomic wt of Ca, Mg, O, C, Cl, S and H are 40, 24, 16, 12, 35.5, 32, and 1 respectively).

(c) Explain the mechanism of free radical addition polymerization reaction. Differentiate between free radical and cationic polymerization reaction.

Roll No.

TEV-201

B. Tech. (SECOND SEMESTER)
END SEMESTER EXAMINATION, 2019

(All Branches)

ENVIRONMENTAL SCIENCE

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any two sub questions in
each main question.

(iii) Total marks for each main question
is twenty.

1. Attempt any two parts of choice from (a), (b)
and (c). (10×2=20 Marks)

(a) Define ecological pyramids. Discuss
various types of pyramids in detail.

(2)

TEV-201

- (b) Define food web with the help of an example. Why is the concept of food web more real ecologically than the concept of a simple food chain ?
- (c) Define ecological succession. Describe the causes and basic types of ecological succession.
2. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$
- (a) What is Deforestation ? How does deforestation cause deterioration of the quality of life in a tribal society ?
- (b) Discuss the importance of biodiversity regarding direct and indirect values.
- (c) "A renewed interest in rain water harvesting emerged in recent decades". Comment.
3. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$
- (a) What do you understand by the term Solid Waste ? Discuss various methods for the management of solid waste.

(3)

TEV-201

- (b) Discuss waste water treatment plant in detail.
- (c) Define Noise Pollution. Discuss sources, effects and methods to reduce noise pollution.
4. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$
- (a) What is sustainable development ? What are the necessary conditions for achieving sustainability ?
- (b) "In which of the many environmental issues should one participate ?" Give your personal comment on the statement.
- (c) Define acid rain. Discuss the effects of acid rain on environment.
5. Attempt any two parts of choice from (a), (b) and (c). $(10 \times 2 = 20 \text{ Marks})$
- (a) Define ecology and ecosystem. Explain the role of producers, consumers and decomposers in an ecosystem.

(4)

TEV-201

- (b) What is ozone layer depletion' ? What are the causes of ozone layer depletion ? What are the effects of depletion of ozone layer ?
- (c) Write short notes on the following :
- (i) Eutrophication
 - (ii) Bioaccumulation

TEV-201

400

Roll No.

TEC-201

B. TECH. (SECOND SEMESTER) END SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

BASIC ELECTRONICS ENGINEERING

Time : Three Hours

Maximum Marks : 100

- Note : (i) All questions are compulsory.
(ii) Answer any *two* sub questions in each main question.
(iii) Total marks for each main question are twenty.

1. Attempt any *two* questions of choice from (a),
(b) and (c). $(2 \times 10 = 20 \text{ Marks})$
 - (a) Define doping. With the help of neat diagram explain formation of n type semiconductor by doping.
 - (b) An intrinsic semiconductor (Si) is doped with a donor type impurity such that there is one impurity atom on 10^6 atoms of semiconductor. If density of silicon is

(2)

TEC-201

$5 \times 10^{22}/m^3$ and intrinsic concentration is $2.5 \times 10^{12}/m^3$, then calculate :

- (i) Resulting donor atom concentration
 - (ii) Resulting electron concentration
 - (iii) Resulting hole concentration
 - (iv) Conductivity of the doped sample if mobility of electrons is $3800 \text{ m}^2/\text{V}\cdot\text{s}$
 - (c) What do you mean by space charge region (or depletion layer)? With the help of neat circuit diagram, explain biasing of p-n junction diode.
2. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$
- (a) What is need of filter in a regulated power supply? With the help of neat circuit diagram, explain working of pi filter.
 - (b) The turn ratio of a transformer used in a half wave rectifier is 12 : 1. The primary is connected to the power mains 220 V, 50 Hz. If diode resistance is 20Ω and the load resistance is $5 \text{ k}\Omega$, calculate the following parameters :
 - (i) Average value of current through load

(3)

TEC-201

- (ii) DC output power
 - (iii) AC input power
 - (iv) Rectification efficiency
 - (v) Draw circuit diagram for the given data
- (c) Differentiate between avalanche breakdown and Zener breakdown. Calculate current through Zener diode (I_z) for the regulator circuit shown in figure 1.

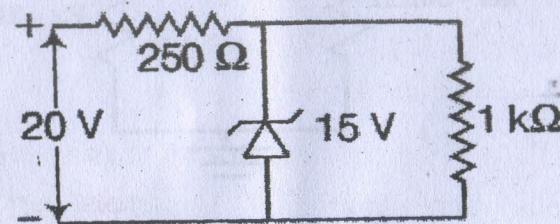


Fig. 1

3. Attempt any two questions of choice from (a), (b) and (c). $(2 \times 10 = 20 \text{ Marks})$
- (a) With the help of circuit diagram explain input-output characteristics of a common base transistor.
 - (b) Determine operating point (V_{CEQ} , I_{CQ}) and stability factor for the self bias circuit