

AR18

CODE: 18CET206

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

ENGINEERING GEOLOGY

(Civil Engineering)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Describe the importance of Geology in Civil Engineering? 6M
b) What is the significance of different physical properties in mineral identification? 6M
(OR)
2. a) Outline the geological work of rivers? 6M
b) Summarize the weathering of rocks? 6M

UNIT-II

3. a) Explain the grades and zones of metamorphism? 6M
b) Simplify the sequence of formation of different groups of rocks? 6M
(OR)
4. a) Briefly discuss the classification of rocks. 6M
b) Identify the importance of Petrology in Civil Engineering? 6M

UNIT-III

5. a) What are the effects of folding and their civil engineering importance? 6M
b) Summarize the unconformities? 6M
(OR)
6. a) Categorize the joints in igneous, sedimentary and metamorphic rocks? 6M
b) Categorize the causes for development of structures? 6M

UNIT-IV

7. a) Classify the rocks based on the porosity and permeability. 6M
b) Summarize the demand of ground water? 6M
(OR)
8. a) Describe the geological controls of Groundwater? 6M
b) Summarize the causes of landslides? 6M

UNIT-V

9. a) Explain the instruments used in seismic studies? 6M
b) What are the classifications of geophysical methods? 6M
(OR)
10. a) Summarize the geological considerations in the selection of Dam site? 6M
b) Explain the economic aspects of Reservoir? 6M

AR18

CODE: 18BST209

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

BIOLOGY

(Common to EEE & ME)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain the differences between Eye and Camera, Bird fly and Air Craft? 6M
b) Discuss the role of Biology in Engineering. 6M
(OR)
2. a) Discuss how biological observations helpful for major discoveries? 6M
b) Explain the origin of thermodynamics. 6M

UNIT-II

3. a) Classify the organisms based on Cellularity? 6M
b) Explain the concepts of sterilization and Growth kinetics? 6M
(OR)
4. a) Write the Ultra structure of Prokaryote. 6M
b) Describe the ecological aspects of single celled organisms? 6M

UNIT-III

5. a) Demonstrate the Law of independent assortment. 6M
b) Discuss about sugars, starch and cellulose. 6M
(OR)
6. a) Explain the concepts of Recessiveness and Dominance of gene. 6M
b) Discuss about Genetic Code and Genetic Recombination. 6M

UNIT-IV

7. a) Describe the concepts of enzyme kinetics and kinetic parameters? 6M
b) Explain the role of proteins as enzymes and structural elements? 6M
(OR)
8. a) Classify the types of Enzymes? 6M
b) Why all enzymes are proteins but all proteins are not enzymes? 6M

UNIT-V

9. a) Why is the Kreb's Cycle the central pathway of the cell? 6M
b) Write differences between Exothermic and Endothermic reactions? 6M
(OR)
10. a) Summarize the relation between Thermodynamics and Biological systems? 6M
b) Describe the process of Photosynthesis? 6M

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Derive the expression for Electric field intensity due to infinite sheet of charge. 6M
- b) Define Electric potential and derive the relationship between electric potential and electric field. 6M

(OR)

2. a) Derive the expression for Electric field intensity and potential due to dipole. 6M
- b) Given the electric flux density, $D = 0.3 r^2 \mathbf{a}_r \text{ nC/m}^2$ in free space: (i) find \mathbf{E} at point $P(r=2, \theta=25^\circ, \phi=90^\circ)$; (ii) Find the total charge within the sphere $r=3$ 6M

UNIT-II

3. a) State and explain Biot-Savarts law 6M
- b) Find magnetic field strength, H , on the Z -axis at a point $P(0, 0, h)$, due to a current carrying circular loop, $x^2+y^2=A^2$ in $Z=0$ plane 6M

(OR)

4. a) What is magnetic flux and magnetic flux density? 6M
- b) Derive the expression for magnetic field due to infinite current sheet which has a uniform current density of $\mathbf{K} = K_y \mathbf{a}_y$, placed in XY plane. 6M

UNIT-III

5. a) Give the physical interpretation of Maxwell's equations. Also write Maxwell's equations for static fields in differential form. 6M
- b) A medium characterized by $\mu = 2\mu_0$, $\epsilon = 5\epsilon_0$, and $\sigma = 0$. If $\mathbf{H} = 2 \cos(\omega t - 2y) \mathbf{a}_z$ A/m. Calculate ω and \mathbf{E} . 6M

(OR)

6. a) Discuss about magnetic boundary conditions at the interface of conductor-dielectric surface. 6M
- b) Discuss about inconsistency in Ampere's law and derive the modified expression. 6M

UNIT-IV

7. a) What is Poynting theorem? Derive the expression for Poynting vector. 6M
- b) Explain the different types of polarization. 6M

(OR)

8. a) Define uniform Plane wave? What are the characteristics of plane Wave? Explain 6M
- b) A uniform plane wave at a frequency of 1GHz is travelling in a large block of Teflon with $\epsilon_r = 2.1$, $\mu_r = 1$ and $\sigma = 0$. Determine λ , γ , β and η . 6M

UNIT-V

9. a) Explain the significance and utility of $\lambda/8$, $\lambda/4$ and $\lambda/2$ lines. 6M
- b) What is standing wave ratio (SWR)? How it is constructed on Smith chart? 6M

(OR)

10. a) Derive the expression for input impedance of a transmission line in terms of reflection coefficient. 6M
- b) Draw an equivalent circuit of a two wire transmission line and mention its applications. 6M

AR18

CODE: 18BST205

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Regular & Supplementary Examinations, September-2021

**PROBABILITY AND STATISTICS WITH R
(Common to CSE & IT)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. A random variable X has the following probability distribution: **12M**

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

- i) Find k
ii) Evaluate $P(X < 6)$, $P(X \geq 6)$, $P(3 < X \leq 6)$
iii) Find the mean and variance.

(OR)

2. a) The following probability function is given by **6M**

X	-3	-2	-1	0	1	2	3
P(x)	0.05	0.10	2k	0	0.3	k	0.10

Compute

- i) K
ii) $E(4x+5)$
iii) $V(2x+3)$
- b) Out of 800 families with 5 children each, how many families would be expected to have **6M**
(assume equal probability for boys and girls)
- i) three boys and five girls
ii) either two or three boys

UNIT-II

3. A continuous random variable has a probability density function $f(x)=3x^2$, $0 \leq x \leq 1$. **12M**
- i) Find a such that $P(X \leq a) = P(X > a)$
 - ii) Find b such that $P(X > b) = 0.05$
 - iii) Find the mean.

(OR)

4. a) Let x is a random variable with density function $f(x)=x^3/3$; $-1 < x < 2$. **6M**
- i) Find the expected value of $4x+3$
 - ii) Find the expected value of $2x^2+1$
- b) If 20% of the memory chips made in a certain plant are defective, what is the probability that in a lot of 100 randomly chosen for inspection **6M**
- i) at most 15 will be defective
 - ii) at least 10 will be defective

UNIT-III

5. Samples of size two are taken from the population 5,10,14,18,13,24 without replacement. Find **12M**
- i) The population mean
 - ii) The population standard deviation
 - iii) Mean of the sampling distribution of means
 - iv) Standard deviation of the sampling distribution of means

(OR)

6. a) A random sample of size 100 is taken from a population having the mean $\mu=76$ and variance $\sigma^2=256$. What is the probability that the mean of the sample lies between 75 and 78? **6M**
- b) A sample of 100 measurements of breaking strength of cotton threads gave a mean of 7.5 oz and standard deviation of 1.2 oz. Find a 95% confidence interval for the mean breaking strength of cotton threads. **6M**

UNIT-IV

7. The average hourly wage of a sample of 150 workers in a plant A was 2.56 Rs. with a SD of 1.08 Rs. The average hourly wage of a sample of 200 workers in a plant B was 2.87 Rs. with SD of 1.28 Rs. Test, what can an applicants safely assume that hourly wages paid by plant B are higher than those paid by plant A? **12M**

(OR)

8. a) The students in a college were classified according to their intelligence and economic conditions. Test whether intelligence is independent of economic condition at 5% level of significance. **6M**

Economic Condition	INTELLIGENCE			
	Excellent	Good	Mediocre	Dull
Rich	48	199	181	82
Poor	81	185	190	106

- b) A certain cubical dice was thrown 9000 times and 5 or 6 was obtained 3240 times. On the assumption of certain throwing does the data indicate that the dice is unbiased? Test at 5% level of significance. **6M**

UNIT-V

9. a) Fit a exponential curve of the form $Y = ae^{bx}$ to the following data : **6M**

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

- b) Find the Karl Pearson's correlation coefficient to the given data: **6M**

X	16	21	26	23	28	24	17	22	21
Y	33	38	50	39	52	47	35	43	41

(OR)

10. a) Fit a second degree parabola to the following data : **6M**

X	2	4	6	8	10
Y	3.07	12.85	31.47	57.38	91.29

- b) In a partially destroyed laboratory record of analysis of correlation data, the following results are only legible. **6M**

Variance of $x=9$.

Regression lines are $8x-10y+66=0$

$40x-18y-214=0$.

What were

- i) mean values of x and y
- ii) correlation coefficient
- iii) standard deviation of y .

AR16

CODE: 16BS2007

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, September-2021

COMPLEX VARIABLES AND SPECIAL FUNCTIONS

(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. Construct the analytic function whose real part is $u(x,y) = e^x (x \cos y - y \sin y)$ by Milne-Thomson method. 14M

(OR)

2. a) If $f(z)$ is an analytic function of z , prove that 7M
$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) \log |f'(z)| = 0.$$

b) Determine p such that the function $f(z) = [\log_e(x^2 + y^2)]/2 + i \tan^{-1}(px/y)$ is analytic. 7M

UNIT-II

3. a) Estimate the values of $f(2)$ and $f(3)$, if $f(a) = \oint_C \frac{2z^2 - z - 2}{z - a} dz$ 7M
where C is the circle $|z| = 2.5$.
b) Evaluate using Cauchy's integral formula 7M
$$\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{z^2 - 3z + 2} dz$$
 where C is the circle with centre at origin and radius is 3.

(OR)

4. If $\phi(z) = \int_C \frac{5z^2 - 4z + 3}{z - e_z} dz$ where C is the curve $(\frac{x}{3})^2 + (\frac{y}{4})^2 = 1$ find 14M
(a). $\phi(4.5)$
(b). $\phi(2)$
(c). $\phi'(i)$
(d). $\phi''(-2i)$

UNIT-III

5. a) Find the Laurent series expansion of $\frac{z^2+1}{z^2-5z+6}$ about $z=0$ in the annulus $2<|z|<3$. 7M
- b) Define removable singularity, pole and essential singularity. 7M
- (OR)**
6. a) Classify the singularities of the following functions
- (i) $f(z) = \frac{e^z - 1}{z}$ (ii) $f(z) = \frac{1}{(z-1)(z-2)}$ (iii) $f(z) = z^2 e^{1/z}$ 7M
- b) Find the Laurent series expansion of the function $\frac{z^2-1}{(z+2)(z+3)}$ for $|z| > 3$ 7M

UNIT-IV

7. Evaluate $\int_0^\infty \frac{\sin mx}{x} dx$, when $m > 0$. 14M
- (OR)**
8. Apply the calculus of residues. evaluate $\int_0^{2\pi} \frac{d\theta}{(a+b\cos\theta)}$. ($a > b > 0$). 14M

UNIT-V

9. a) Define Beta and gamma functions and express the following integral in terms of gamma function $\int_0^{\pi/2} \sqrt{\tan \theta} d\theta$ 7M
- b) Compute $\Gamma(0.5)$, $\Gamma(4.5)$ and $\Gamma(-3.5)$. 7M
- (OR)**
10. a) (a) Express the following integral in terms of gamma function $\int_0^\infty \frac{x^a}{a^x} dx$ 7M
- b) (b) Evaluate $\int_0^\infty e^{-ax} x^6 dx$ using gamma function. 7M

AR16

CODE: 16HS2004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, September-2021

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Mechanical Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. What is managerial economics? Explain the nature and scope of managerial economics. 14 M

(OR)

2. a) Discuss the factors influencing demand for a product in the market. 7 M
b) Define the law of demand. Explain the exceptions to the law of demand. 7 M

UNIT-II

3. a) What is price elasticity of demand? Explain the types of price elasticity of demand. 8 M
b) Discuss the importance of expert opinion method to demand forecasting. 6 M

(OR)

4. a) Explain the statistical techniques of demand forecasting. 8 M
b) Describe the cross elasticity of demand with suitable examples. 6 M

UNIT-III

5. a) Define production function. Explain Cobb-Douglas production function. 8 M
b) Analyse the influence of external economies of scale on production. 6 M

(OR)

6. a) From the following information calculate: 8 M
(i) PV Ratio
(ii) Margin of safety
(iii) Total sales, and
(iv) Variable cost

Fixed costs Rs. 12,000

Profit Rs. 1,000

Break-Even Sales Rs.60,000

- b) Discuss the managerial significance and limitations of Breakeven analysis. 6 M

UNIT-IV

7. a) What is perfect competition? Explain the features of a perfectly competitive market. 8 M
b) Define market. Discuss the features of market structure. 6 M

(OR)

8. a) What is Internal rate of return? Explain the steps to calculate IRR. 6 M
 b) The initial cost and the net cash flow over five years to the firm for each machine 8 M
 is as follows and assuming the cost of capital to be 12%, determine NPV.

	Machine X	Machine Y
Initial cost (Rs.)	20,000	28,000
Net cash flows (Rs.)		
1st year	8,000	10,000
2nd year	12,000	12,000
3rd year	9,000	12,000
4th year	7,000	9,000
5th year	6,000	9,000

UNIT-V

9. From the following trail balance of Surya & Co. as on 31st March 2020, Prepare 14 M
 the Trading account, Profit & Loss account and Balance sheet as on date.

Particulars	Debit (Rs.)	Credit (Rs.)
Capital		70,000
Purchases	40,000	
Sales		75,000
Returns	1,000	2,000
Opening stock	20,000	
Wages	1,000	
Coal & Power	1,500	
Carriage Inwards	3,000	
Salaries	2,000	
Sundry Debtors	15,000	
Sundry Creditors		12,500
Bills Payable		5,000
Bills Receivable	10,000	
Plant & Machinery	7,500	
Cash in Hand	27,000	
Cash at Bank	15,000	
Discount	500	
Discount received		2,000
Loans		5,000
Bank Overdraft		5,000
Buildings	33,000	
Total	176,500	176,500

Adjustments:

Closing stock Rs. 30,000

(OR)

10. a) Journalize the following transactions in the books of ABC Ltd. Company. 7 M
 May 1st Paid salaries Rs. 5000
 May 4th Sold goods to Venkat Rs. 10000
 May 10th Sold machinery Rs. 30000
 May 13th Commission received Rs. 2000
 May 18th Allowed discount Rs. 1000
 May 22nd Brought goods from Raghava Rs. 4000
 May 31st Sold goods to Abhi for cash Rs. 6000
 b) What is double entry bookkeeping system? Discuss its advantages and 7 M
 disadvantages.

AR16

CODE: 16EC2008

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, September-2021
ELECTROMAGNETIC FIELD THEORY AND TRANSMISSION LINES
(Electronics and Communication Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Derive the Electric Field intensity due to infinite line charge 7M
- b) Write short note on Continuity Equation 7M

(OR)

2. a) Derive the expression for electric field at any point due to infinite line charge. 7M
- b) State and prove Gauss's law. List the limitations of Gauss's law. 7M

UNIT-II

3. a) State Ampere's circuital law. Specify the conditions to be met for determining magnetic field strength H, based on Ampere's circuital law. 7M
- b) Explain the concept of Magnetic scalar and vector potential. 7M

(OR)

4. a) Given $E = E_m \sin(\omega t - \beta z) \hat{a}_y$ in free space. Find the D, B and H. 7M
- b) Write the Maxwell's equations of EM static field in point form and integral form? 7M

UNIT-III

5. a) What is inconsistency associated with Ampere's law and Displacement current Density. 7M
- b) Derive the electric field boundary conditions between dielectric and conductor? 7M

(OR)

6. a) State and Explain Faraday's law for induced e.m.f. 7M
- b) Explain the concept of retarded potentials. 7M

UNIT-IV

7. a) What is Poynting theorem? Derive the expression for Poynting vector. 7M
- b) Explain the different types of polarization. 7M

(OR)

8. a) Explain oblique incidence wave propagation with perpendicular polarization. 7M
- b) Derive the expression for characteristic impedance 7M

UNIT-V

9. a) Derive the primary & secondary constants for a low loss transmission line. 7M
- b) A transmission line of length 0.3λ has a characteristic impedance of 100Ω and is terminated in a load of impedance of $200 + j180\Omega$. Find reflection coefficient, VSWR and input impedance. 7M

(OR)

10. a) Show that a line will be distortion free if $CR = LG$. 7M
- b) Write a detailed notes on
i) Stub matching ii) Smith chart and its applications. 7M

AR16

CODE: 16CS2007

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, September-2021

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE & IT)

Time: 3 Hours

Max Marks: 70

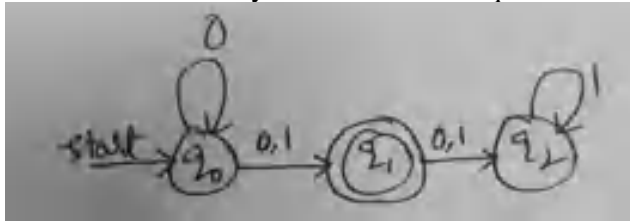
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

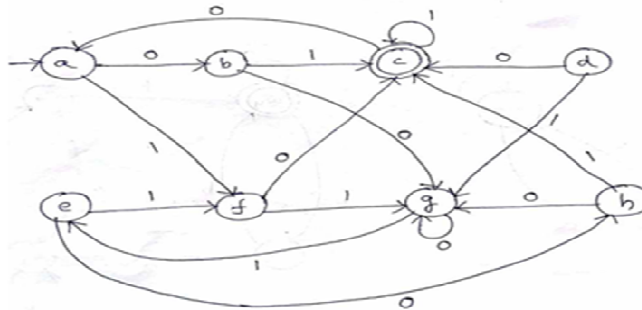
UNIT-I

1. a) Design a DFA that recognizes set of all strings such that the number of 0's is even and the number of 1's is a multiple of 3 over the input alphabet $\Sigma = \{0,1\}$. 7M
- b) Define NFA formally. Construct DFA equivalent to the following NFA. 7M



(OR)

2. a) Define Moore Machine formally. Construct a Moore Machine to output the decimal equivalent of a given two bit binary number. 7M
- b) Minimize the following DFA. 7M



UNIT-II

3. a) List the closure properties of regular languages. Write the regular expressions for the following languages. 7M
 - (i) The set of all strings of 0's and 1's not containing 101 as a substring.
 - (ii) The set of strings over alphabet {a,b,c} containing at least one a and b.
- b) Construct regular expression equivalent to the following DFA. 7M

States/ Σ	0	1
$\rightarrow q1$	q2	q1
q2	q3	q1
*q3	q3	q2

(OR)

4. a) List the identity rules for regular expressions. 7M
- b) Construct DFA for the regular expression $00(0+1)^*$. 7M

UNIT-III

5. a) Define Context Free Grammar. Construct a CFG for the language $L = \{0^n a 1^n \mid n \geq 1\}$. 7M
b) Minimize the following Grammar. 7M
 $S \rightarrow ASB \mid \epsilon$
 $A \rightarrow aAS \mid a$
 $B \rightarrow SbS \mid A \mid bb$
- (OR)**
6. a) When do you say a grammar is in Greibach Normal Form? Construct GNF for the following grammar. 7M
 $S \rightarrow AA \mid 0$
 $A \rightarrow SS \mid 1$
b) What is an ambiguous grammar? Prove that the following grammar is ambiguous. 7M
 $S \rightarrow aS \mid aSbS \mid \epsilon$

UNIT-IV

7. a) Construct a PDA for the language $L = \{a^n b^n \mid n \geq 1\}$. Show the instantaneous description of the PDA on the input string “**aaaabbbb**”. 7M
b) Construct a PDA equivalent to the following grammar. 7M
 $S \rightarrow 0S1 \mid A$
 $A \rightarrow 1A0 \mid S \mid \epsilon$
- (OR)**
8. a) Construct a PDA equivalent to the language $L = \{a^n b^m c^{2(n+m)} \mid n \geq 0, m \geq 0\}$. 7M
b) Define PDA formally. Explain about the model and working of a PDA. 7M

UNIT-V

9. a) What are the various formal languages under Chomsky Hierarchy? Explain in detail. 7M
b) Design Turing Machines for the following. 7M
(i) To compute 1's complement of a binary string.
(ii) To compute 2's complement of a given binary string.
- (OR)**
10. a) Define Post's Correspondence Problem. Check and tell whether the following PCP instance has a solution. 7M
 $A = (01, 001, 10)$
 $B = (011, 10, 00)$
b) What do you mean by a Universal Turing Machine? Explain. 7M