

III B. Tech II Semester Supplementary Examinations, November/December-2016

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours

Maximum Marks: 70

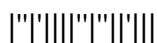
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Sketch a split-spoon sampler and explain its parts. [4M]
- b) If a uniform surcharge of 120 kN/m^2 is placed on the backfill with $\phi^1 = 30^\circ$, find out the increase in pressure. [3M]
- c) What are the factors influencing the bearing capacity? [3M]
- d) A 2 m wide strip footing rests at a depth of 2 m below the ground surface where water table is at the ground surface. Find the ultimate load which the strip can carry according to Terzaghi's theory when $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$ and $C = 30 \text{ kN/m}^2$. [4M]
- e) Describe the types of pile foundations. [4M]
- f) What is tilt and shift in well foundations? [4M]

PART -B

- 2 a) Describe with a neat sketch how will you carry out the wash boring method of soil exploration. What are its merits and demerits? [8M]
- b) Compute the area ratio of a sampler with inside diameter 70 mm and thickness 2 mm. Comment. [8M]
- 3 A retaining wall is 7 m high, with its back face smooth and vertical. It retains sand with its surface horizontal. Using Rankine's theory, determine active earth pressure at the base when the backfill is (a) dry (b) saturated and (c) submerged, with water table at the surface. Take $\gamma = 18 \text{ kN/m}^3$ and $\phi = 30^\circ$, $\gamma_{\text{sat}} = 21 \text{ kN/m}^3$. [16M]
- 4 A circular plate of diameter 1.05 m was placed on a sand surface of unit weight 16.5 kN/m^3 and loaded to failure. The failure load was found to give a pressure of $1,500 \text{ kN/m}^2$. Determine the value of the bearing capacity factor N . The angle of shearing resistance of the sand measured in a triaxial test was found to be 39° . Compare this value with the theoretical value of N . Use Terzaghi's theory of general shear failure. [16M]
- 5 a) Write brief note on elastic settlements. [8M]
- b) Estimate the immediate settlement of a concrete footing $1.5 \text{ m} \times 1.5 \text{ m}$ in size founded at a depth of 1 m in silty soil whose modulus of elasticity is 90 kg/cm^2 . The footing is expected to transmit a unit pressure of 200 kN/m^2 . Assume $\mu = 0.35$, $I_f = 0.82$ for a rigid footing. [8M]
- 6 a) Explain the basic difference in the bearing capacity computation of shallow and deep foundations. [8M]
- b) A 30 cm square pile, 15 m long, is driven in a deposit of medium dense sand ($\phi = 36^\circ$, $N\gamma = 40$ and $Nq = 42$). The unit wt. of sand is 15 kN/m^3 . What is the allowable load with a factor of safety of 3? Assume lateral earth pressure coefficient = 0.6. [8M]
- 7 An open caisson, 19 m deep, has external and internal diameters of 8 m and 6 m, respectively. If the water level is 2 m below the top of the well and the depth of the base below the scour level is 5m, determine the minimum thickness of the seal that will enable complete dewatering of the caisson. Take $\sigma_c = 2000 \text{ kN/m}^2$, $\gamma_c = 24 \text{ kN/m}^3$ and allowable perimeter shear of 650 kN/m^2 . [16M]



Code No: RT32022

R13

SET - 1

III B. Tech II Semester Supplementary Examinations, November/December-2016

SWITCHGEAR AND PROTECTION

(Electrical and Electronics Engineering)

Time: 3 hours

Maximum Marks: 70

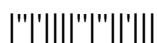
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) List the advantages of Oil circuit Breakers. [4M]
- b) How is definite minimum time achieved in an IDMT relay? [4M]
- c) What are the difficulties experienced in differential protection of a Generator? How are they over – come? [4M]
- d) What is the need of bus bar protection? Explain. [4M]
- e) What are the applications of static relays? [3M]
- f) What are the requirements of a good lightning arrester? [3M]

PART -B

- 2 a) What is resistance switching and derive the expression for the value of resistance to be inserted to reduce RRRV. [8M]
- b) What is meant by circuit breaker? Discuss the phenomenon of arc formation in a CB. [8M]
- 3 a) List the properties of SF₆ gas and explain how it is used in circuit breakers. [8M]
- b) Explain the Operation principle and characteristics of MHO and Off set MHO relay [8M]
- 4 a) With suitable diagram, describe the application of the Mertz-Price circulating current system to protect the alternator. What precautions must be taken in installing this system? [10M]
- b) A 3- ϕ , star- delta 11/6.6 KV transformer is protected by means of differential protection system. The 6.6kv delta connected side has CT ratio 600/5. Calculate CT ratio on HT side. [6M]
- 5 a) Explain about the over current protection of bus bars with relevant connection diagram [8M]
- b) Describe the protection scheme of a single feeder using Translay relay. [8M]
- 6 a) Explain the operation of static impedance relay along with its characteristics. [8M]
- b) Explain the Working principle and importance of zero crossing detectors used in the static relays. [8M]
- 7 a) What are the causes of over voltages arising in a power system? Why is it necessary to protect the lines and other equipment of the power system against over voltages? [10M]
- b) A 132 kV, 3 Φ , 50Hz overhead line 50km long has a capacitance to earth for each line of 0.0157 μ F per km. Determine the inductance and kVA rating of the arc suppression coil suitable for this system. [6M]



III B. Tech II Semester Supplementary Examinations, November/December-2016

INTERACTIVE COMPUTER GRAPHICS

(Mechanical Engineering)

Time: 3 hours

Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. Answering the question in **Part-A** is compulsory

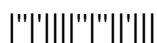
3. Answer any **THREE** Questions from **Part-B**

PART -A

- | | | |
|---|--|------|
| 1 | a) Explain the working of Three-Dimensional Viewing Devices. | [4M] |
| | b) What is meant by Shear Transformation of an object? | [4M] |
| | c) What is meant by clipping? | [3M] |
| | d) What is meant by a translation vector? | [3M] |
| | e) Explain Constant-Intensity Shading. | [4M] |
| | f) What is meant by output primitives? | [4M] |

PART -B

- | | | |
|---|--|----------------|
| 2 | a) Explain the different categories and types of Flat-Panel Displays. | [8M] |
| | b) What is meant by reflection of an object? How do we achieve i) reflection of an object about the x-axis ii) reflection of an object about the y-axis. | [2M]
[3+3M] |
| 3 | a) Explain how a two-dimensional rotation is applied to an object. | [12M] |
| | b) What are the two categories of representation schemes for solid objects? | [4M] |
| 4 | a) Explain Gouraud Shading. | [4M] |
| | b) Write the vector generation algorithm for line drawing. | [12M] |
| 5 | Explain about Point Clipping and Line Clipping. | [16M] |
| 6 | Write and explain the depth-buffer algorithm which is used to detect visible surfaces. | [16M] |
| 7 | a) Explain how a point is translated from position $P=(x,y,z)$ to position $Q=(a,b,c)$ in a three dimensional homogeneous coordinate representation. | [8M] |
| | b) Explain the various Motion Specifications that can be used in an animation system. | [8M] |



III B. Tech II Semester Supplementary Examinations, November/December-2016

DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Time: 3 hours

Maximum Marks: 70

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PART -A

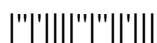
- 1 a) What is BIBO stability? What are the conditions for BIBO stability? [3M]
- b) Distinguish between linear and circular convolutions of two sequences. [4M]
- c) Define canonic and non-canonic structures. [4M]
- d) Explain Gibb's phenomenon. [4M]
- e) Show that the interpolator is a time-variant system. [3M]
- f) Write down the applications of each of the families of TIs DSPs. [4M]

PART -B

- 2 a) Explain the method of obtaining the frequency response of linear shift-invariant systems. [4M]
- b) For the following discrete time signals, determine whether or not the system is linear, shift invariant, causal and stable. [8M]
 - (i) $y(n)=x(n+7)$ (ii) $y(n)=x^3(n)$
- c) Determine the magnitude and phase response of the following system: [4M]
 $y(n)=[x(n) + x(n-1)]/2$.
- 3 a) State shifting property of the DFT. [3M]
- b) Compute the FFT for the sequence $x(n)=n^2+1$ where $N=8$ using DIT algorithm. [8M]
- c) What is DIT FFT algorithm? [5M]
- 4 a) How will you develop a cascade structure with direct form II realization of a sixth order IIR transfer function? [7M]
- b) Realize an FIR filter with impulse response is given by [9M]
 $h(n) = (1/2)^n[u(n) - u(n - 5)]$
- 5 a) Compare bilinear transformation and other transformations based on their stability. [7M]
- b) The desired frequency response of a low-pass filter is [9M]

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega}, & -\frac{3\pi}{4} \leq \omega \leq \frac{3\pi}{4} \\ 0, & 3\pi/4 < |\omega| \leq \pi \end{cases}$$

Determine $H(e^{j\omega})$ for $M=7$ using a rectangular window.
- 6 a) Discuss the computationally efficient implementation of interpolator in an FIR filter. [8M]
- b) Draw and explain the polyphase structure of a decimator. [8M]
- 7 a) List the family members of the first generation TMS processor and note down the distinguished features. [7M]
- b) List the enhanced features of the TMS320C5X processor. [9M]



III B. Tech II Semester Supplementary Examinations, November/December-2016

DATA WARE HOUSING AND MINING

(Common to CSE and IT)

Time: 3 hours

Maximum Marks: 70

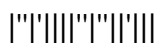
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2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is outlier mining? Define Data characterization. [3M]
 b) Define data mining? Mention the steps in the data mining process? [4M]
 c) What is clustering? What are the requirements of clustering? [4M]
 d) Define Dimensional Modeling? List out its advantages. [4M]
 e) Merits of Data Warehouse. What are the characteristics of Data Warehouse? [4M]
 f) What is support and confidence? What is its purpose in association mining? [3M]

PART -B

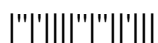
- 2 a) How is a *data warehouse* different from a database? How are they similar? [5M]
 b) Explain the OLAP operations in multidimensional model? [7M]
 c) Discuss the components of Data warehouse? [4M]
- 3 a) How might you determine *outliers* in the data? What other methods are there for *data smoothing*? [5M]
 b) List out and describe the primitives for specifying a data mining task. [6M]
 c) i) What are the value ranges of the following *normalization methods*? [5M]
 (a) min-max normalization
 (b) z-score normalization
 (c) normalization by decimal scaling
 ii) Use the two methods below to *normalize* the following group of data:
 200; 300; 400; 600; 1000
 (a) min-max normalization by setting *min* = 0 and *max* = 1
 (b) z-score normalization
- 4 a) Briefly discuss about data mining task primitives. [8M]
 b) What is data mining? Draw and explain the architecture of a typical data mining system? [8M]
- 5 a) Compare the Advantages and Disadvantages of *Eager Classification* (e.g., decision tree, Bayesian, neural network) versus *Lazy Classification* (e.g., k-nearest neighbor, case-based reasoning). [9M]
 b) Explain the issues regarding Classification and Prediction? [7M]



- 6 a) Consider the following data set for a binary class problem. [9M]

A	B	Class Label
T	F	+
T	T	+
T	T	+
T	F	-
T	T	+
F	F	-
F	F	-
F	F	-
T	T	-
T	F	-

- i) Calculate the information gain when splitting on A and B . Which attribute would the decision tree induction algorithm choose?
 ii) Calculate the gain in the Gini index when splitting on A and B . Which attribute would the decision tree induction algorithm choose?
- b) What is decision tree? Explain the algorithm for generating a decision tree with a suitable example? [7M]
- 7 a) What is cluster Analysis? Briefly explain K-means also with an example? Write its advantages and disadvantages. [9M]
- b) Explain the Model-based method of clustering? [7M]



III B.Tech II Semester Supplementary Examinations, November/December - 2016
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain the important viruses responsible for water borne diseases along with their remedial measures. [8M]
 b) Write a detailed on storage capacity and its significance. [7M]
- 2 Explain about Mass Curve Method. Find the capacity of a storage reservoir for the data given below: Population = 50000; per capita rate of supply = 100lpcd; peak demand factor = 2.5 and water supply is continuous.

Time (h)	6am to 10am	10am to 12 noon	12 noon to 1pm	1pm to 2pm	2pm to 5pm	5pm to 6pm	6pm to 8pm	8pm to 10pm
Avg. hourly demand factor	2.5	1.2	1.0	2.5	0.9	2.5	1.6	0.9

[15M]

Time (h)	10pm to 11pm	11pm to 4am	4am to 5am	5am to 6am
Avg. hourly demand factor	0.6	0.4	0.6	1.4

- (i) Power is not available from 6 am to 10am daily: 16h of pumping from 10pm to 6am and 10am to 6pm
 (ii) Power is available throughout 24 hours: 8h of pumping from 4 am to 8am and 2pm to 6pm.

- 3 a) What is objective of adding Alum to water before filtration? Why only is alum suggested? [8M]
 b) Give the detailed classification of Sedimentation tanks with relative merits and demerits. [7M]
- 4 a) Explain the following terms: Pre chlorination and Break Point Chlorination. [8M]
 b) Discuss the relative merits and demerits of Rapid Gravity Filters and Pressure Filters indicating conditions favorable for the choice of each. [7M]
- 5 a) Discuss the relative merits of the separate and the combined system of sewerage and give the conditions favorable for the adoption of each one of them. [8M]
 b) What are the various cycles of decay? Explain any two in detail with neat sketches. [7M]
- 6 a) Explain the principle of working of oil and grease trap. Mention the reasons for excluding grease and oil from sewage. [8M]
 b) State the significance of House drainage system along with its components. [7M]



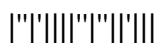
Code No: **R32012**

R10

Set No. 1

- 7 a) Design a secondary sedimentation tank to treat effluent from Activated Sludge plant with the following data: [10M]
Average sewage flow = 60Mld; mixed liquor suspended solids (MLSS) concentration of influent = 3000mg.l; peak flow factor = 2.5.
- b) Give the layout of primary treatment unit operations of wastewater treatment plant. [5M]
- 8 a) Explain the construction details of Anaerobic Ponds with neat sketch. [8M]
- b) Discuss the various methods of disposal of septic tank effluent. [7M]

2 of 2



Code No: R32022

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November/December - 2016

POWER SYSTEM ANALYSIS

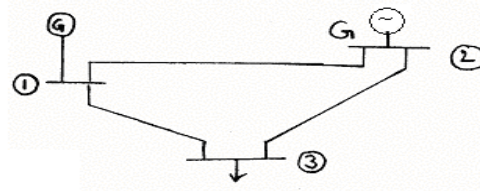
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

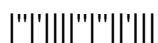
- 1 a) Explain the p.u. system of analyzing power system problems. [6M]
b) A single phase two winding transformer is rated 20KVA, 480/120V at 50Hz. [9M]
The equivalent leakage impedance of the transformer referred to L.V. side is $0.0532 \angle 78.13^\circ \Omega$ using transformer ratings as base values, determine the per unit leakage impedance referred to the H.V. side and L.V. side.
- 2 The load flow data for the power system shown in figure is given in the [15M]
following tables:



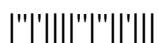
Bus code p-q	Impedance z_{pq}
1-2	$0.06+j0.24$
1-3	$0.02+j0.04$
2-3	$0.08+j0.18$

Bus code	Assumed bus voltage	Generation		Load	
		Megawatts	Megavars	Megawatts	Megavars
1	$1.05+j0$	0	0	0	0
2	$1.0+j0$	20	0	60	20
3	$1.0+j0$	0	0	70	25

The voltage magnitude at bus 2 is to be maintained at 1.05 p.u. The maximum and minimum reactive power limits of the generator at bus 2 are 55 and 0 MVAR respectively. With bus 1 as slack bus, obtain voltage at bus 3 using G.S. method after first iteration.



- 3 a) Derive the elements of Jacobian matrix by using N-R polar coordinates method. [8M]
b) Compare Gauss-Seidel, Newton-Raphson and fast decoupled load flow methods. [7M]
- 4 a) Give the applications of the building algorithm. [6M]
b) Explain what is primitive network, primitive admittance and impedance matrix. Explain by giving an example. [9M]
- 5 a) Briefly explain the importance of three phase symmetrical fault analysis of a power system. State the reasons for change of fault current with time and its effect on breaker capacity. [6M]
b) A power plant has two generators of 30 MVA, 15% reactance each and two 10 MVA generators of 10% reactance paralleled at a common bus bar from which load is taken through a number of 4 MVA step up transformers each having a reactance of 5%. Determine the short circuit capacity of the breakers on the:
(i) low voltage, and
(ii) high voltage side of the transformer. [9M]
- 6 a) The symmetrical components of a set of unbalanced three-phase current are $I_{a1} = 4\angle 45^\circ$, $I_{a2} = 6\angle 90^\circ$, $I_{a3} = 3\angle 45^\circ$. Obtain the original un-balanced phasors. [8M]
b) Explain the importance of sequence impedances of an unloaded synchronous generator. [7M]
- 7 a) Derive an expression for the fault current for a line-to-line fault at an unloaded generator. [7M]
b) A synchronous generator 50 MVA, 15.8 KV has subtransient reactance, negative sequence reactance and zero sequence reactance equal to $j0.2$, $j0.2$ and $j0.08$ respectively. If a LLG fault occurs at the terminals of the generator (neutral solidly grounded) find fault current. [8M]
- 8 a) Explain point by point method of determining swing curve. [7M]
b) A double circuit, 3-phase feeder connects a single generator to a large network. The power corresponding to the limit of steady state stability for each circuit is 85 MW. The line is transmitting 50 MW, where one of the circuits is suddenly switched out. Determine with reference to appropriate diagram whether the generator is likely to remain in stability. [8M]



Code No: R32032

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November/December – 2016

ROBOTICS

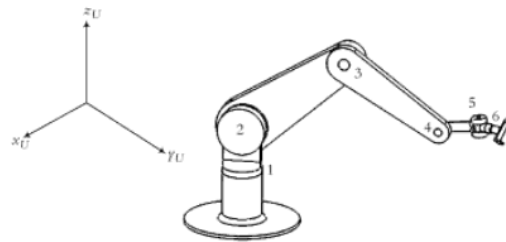
(Mechanical Engineering)

Time: 3 hours

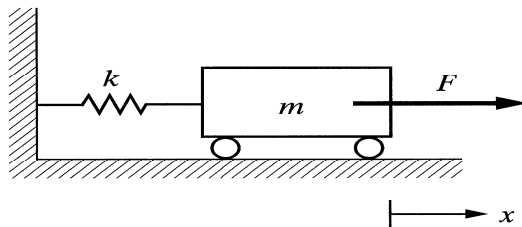
Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain about robot anatomy.
b) What are the future applications of robot?
- 2 a) Explain about Function line diagram representation of robot arms.
b) What are the common types of arms?
- 3 Derive RPY matrix orientation and find out values of $\phi_a \phi_o \phi_n$.
- 4 For the simple 6-DOF robot of figure, assign the necessary coordinates frames based on the D-H representation, fill out the accompanying parameters table and derive the forward kinematic equation of the robot.



- 5 a) Derive the force-acceleration relationship for the one-degree of freedom system.



- b) Distinguish between Lagrangian and Newtonian mechanics.



Code No: **R32032**

R10

Set No. 1

- 6 Write a brief note on
(i) path planning
(ii) Skew motion
(iii) joint integrated motion
(iv) straight line motion
- 7 a) What are the advantages of Stepper Motors?
b) Explain about velocity sensors.
- 8 Explain about assembly operations with neat sketch.



Code No: R32042

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November/December-2016

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Obtain the expression for characteristic impedance of a rectangular waveguide for TE mode of propagation. [10M]
b) A rectangular waveguide has a dimension of $a = 22.86\text{mm}$. Calculate the b dimension such that cut-off wavelength of TE_{11} mode is half that of TE_{10} mode. [5M]
- 2 a) Obtain the expressions for fields in a circular wave guide for TM mode. [7M]
b) Discuss the salient features of micro strip lines and also discuss effective dielectric constant using relevant expressions and diagrams. [8M]
- 3 a) Describe the operating principle of a rat race junction. [7M]
b) Describe the working of a rotary vane type phase shifter. [8M]
- 4 a) A 20mW signal is fed into one of the ports of main arm of a lossless directional coupler with C 20dB and D 50dB. Find power at all other ports. [5M]
b) Obtain the S-matrix of E-plane Tee. [10M]
- 5 a) Derive the value for maximum efficiency of reflex klystron. [10M]
b) Discuss the structure of different types of cavities used in klystrons. [5M]
- 6 a) Starting from the basic equation of motion, obtain the expressions for cyclotron frequency, Hull cutoff voltage for fixed magnetic flux density for a cylindrical magnetron and Hull cutoff magnetic flux density for fixed beam voltage. [10M]
b) A TWT is operating under the following conditions: acceleration voltage 4.5kV, axial electric field 3.8V/m, operating frequency of 3GHz. The phase velocity of the slow-wave structure is 1.08 times the average beam velocity, determine the magnitude of velocity fluctuation. [5M]
- 7 a) Discuss the principle and operating characteristics of IMPATT diode. [10M]
b) Discuss the properties of high field domain of Gunn diode. [5M]
- 8 a) Explain why an isolator is required in a microwave bench setup. Also explain how a three port circulator can be used as an isolator. Also explain the use of slotted wave guide in the microwave bench setup. [5M]
b) Explain a method for measurement of frequency. [10M]

