

AR18

CODE: 18CET312

SET-1

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

III B.Tech I Semester Regular & Supplementary Examinations, February-2022

**WATER RESOURCES ENGINEERING
(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 with a neat sketch the principle of working of tipping bucket type recording rain gauge. 6M
- b) Explain in detail the processing of rainfall data. 6M
- (OR)
2. a) Explain various methods of estimating the mean rainfall of the basin. 6M
- b) Describe the component of hydrologic cycle with a neat sketch. 6M

UNIT-II

3. a) Draw a single-peaked hydrograph and indicate its various components. State the significance of the inflection point on the recession side of the hydrograph. 6M
- b) Explain construction of S-hydrograph. 6M
- (OR)
4. a) Briefly explain the factors affecting Runoff. 6M
- b) What is unit hydrograph and explain the limitations and its applications. 6M

UNIT-III

5. a) Derive an expression for steady state radial flow into a well under a confined aquifer. 6M
- b) List aquifer properties and differentiate between confined and unconfined aquifers with a neat sketch. 6M
- (OR)
6. a) Classify zones of groundwater with a neat sketch. Explain different saturated formations occurred. 6M
- b) Describe constant level pumping test for an open well. 6M

UNIT-IV

7. a) Define Duty and Delta. Derive the relationship between them. 6M
- b) What is consumptive use and explain various methods for measurement of consumptive use. 6M
- (OR)
8. a) Explain various methods of surface irrigation with neat sketches. 6M
- b) What is water logging? Explain ill effects and control measures of water Logging. 6M

UNIT-V

9. Explain Kennedy's theory and design procedure of channel. 12M
- (OR)
10. Define cross drainage works? Explain briefly about the classification of cross drainage works. 12M

AR18

CODE: 18EET312

SET-2

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

III B.Tech I Semester Regular & Supplementary Examinations, February-2022

**ELECTRICAL MEASUREMENTS
(Electrical and Electronics 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) Explain the working principle of PMMC instrument and write its advantages. 4M
- b) Derive the expression for torque equation for moving iron instrument and comment upon nature of scale. 8M
- (OR)
2. a) Explain how series resistance can extend measuring range of instruments 6M
- b) List out different errors which occur in measuring instruments and how to compensate those errors 6M

UNIT-II

3. a) How Active powers are measured from Balanced and Unbalanced systems 6M
- b) A three phase motor draws a line current of 50 A from 220V source while starting. The power factor is 0.4. Find the readings of two watt meters connected to measure power 6M
- (OR)
4. a) Explain briefly about all effect sensor with proper diagram and write the applications. 6M
- b) Derive the expression for deflecting and control torque for three element dynamo meter watt meter 6M

UNIT-III

5. a) A meter constant of 230v,10A watthour meter is 1800revolutions per kWh. The meter is tested at half load and rated voltage and unity power factor. The meter is found to make 80 revolutions in 138s.determine meter error at half load. 6M
- b) Explain the construction of the Single-phase Electrodynamometer power factor with neat sketch 6M

(OR)

- | | | |
|----|---|----|
| 6. | a) Write a note on Trivector meter and maximum demand meters | 6M |
| | b) Explain single phase induction type energy meter in detail | 6M |

UNIT-IV

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|----|--|----|
| 7. | a) Derive the balance equation of Hay's bridge and draw its Phasor diagram and write its advantages. | 6M |
| | b) Explain the procedure for measuring inductance using Anderson's bridge | 6M |

(OR)

- | | | |
|----|---|----|
| 8. | a) Explain the procedure for measurement of Flux/flux density in a ring specimen with a neat connection diagram | 6M |
| | b) Explain how loss of charge method can be used to measure high resistance in instruments | 6M |

UNIT-V

- | | | |
|----|---|----|
| 9. | a) Explain the working of DC Crompton potentiometer with a neat circuit diagram | 6M |
| | b) What is the resolution of a four and half digital display? How would 17.65 V be displayed on a 10 V range and 0.0356 V on a 1 V and 10 V range | 6M |

(OR)

- | | | |
|-----|---|----|
| 10. | a) Write a note on principle and operation of D.C. Crompton's potentiometer | 6M |
| | b) Explain the procedure for standardizing the Potentiometer | 6M |

**KINEMATICS & DYNAMICS OF MACHINERY
(Mechanical 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

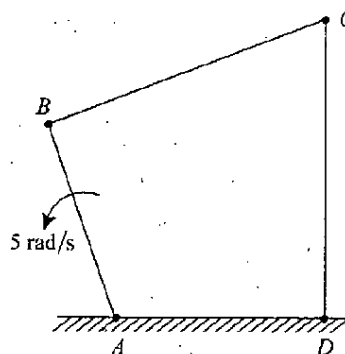
1. a) Explain with a neat sketch describe the classification of kinematic pairs? 5M
- b) Sketch and describe the working of crank and slotted lever quick return mechanisms. Derive an expression for the ratio of times taken in forward and return stroke. 7M

(OR)

2. a) Explain with a neat sketch all inversions of double slider crank mechanism 6M
- b) The Whitworth quick return motion mechanism has the driving crank 120 mm long. The distance between fixed centres is 80 mm. The line of stroke of the ram passes through the centre of rotation of the slotted lever whose free end is connected to the ram by a connecting link. Find the ratio of time of cutting to time of return. 6M

UNIT-II

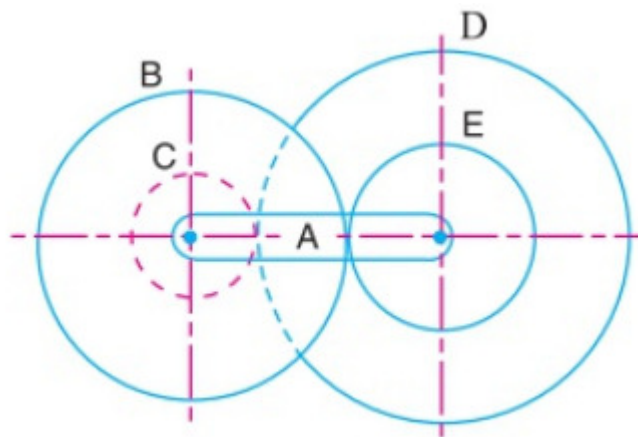
3. a) Identify the location of Instantaneous centre of a body rolling with sliding on a stationary curved surface. 2M
- b) The driver link AB of a four-bar mechanism is rotated at 5.0 rad/s in counter clockwise direction as shown in the above figure, at an instant when angle BAD = 180° . Find angular velocity and angular acceleration of the coupler. Consider AB=AD= $l = 20\text{mm}$, BC=DC= $\sqrt{2}l$. 10M

**(OR)**

4. In the single slider crank mechanism, the crank OA rotates at 20 r.p.m. 12M
 clockwise with an angle of 45 deg from IDC, and gives motion to the
 sliding blocks B. The dimensions of the various links are OA = 300
 mm; AB = 1200 mm. Determine: 1. velocities of sliding at B 2. Angular
 velocity of AB 3. Linear velocity connecting rod at point D a part of
 distance 500 from A. 3. Linear velocity connecting rod at mid-point

UNIT-III

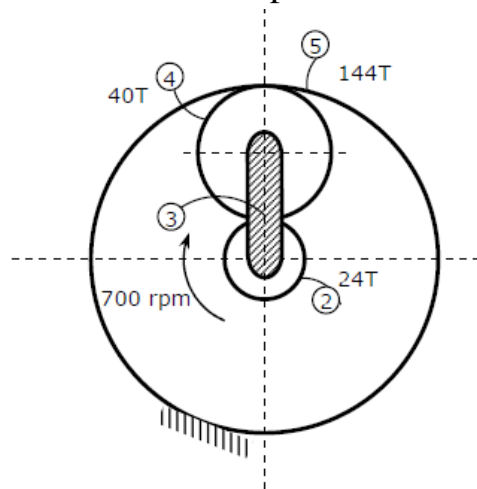
5. a) The following data relate to two meshing involute gears: 6M
 Number of teeth on the gear wheel = 60, Speed of the gear wheel =
 100 rpm,
 Gear ratio = 1.5, and Pressure angle = 20° . The addendum for each
 wheel is such that the path of approach and the path of recess on each
 side are 60% of the maximum possible length each. Determine the
 addendum for the pinion and the gear and the length of the arc of
 contact and the maximum velocity of sliding between the mating
 surfaces.
- b) An epicyclic gear consists of three gears A, B and C as shown in Fig. 6M
 The gear A has 72 internal teeth and gear C has 32 external teeth. The
 gear B meshes with both A and C and is carried on an arm EF which
 rotates about the centre of A at 18 r.p.m. If the gear A is fixed,
 determine the speed of gears B and C.



(OR)

6. a) Find the length of the path of contact, arc of contact and contact ratio 6M
 when pinion with 18 teeth meshes with an internally toothed wheel
 with 72 teeth, when the pressure angle is 20° , module is 4 mm and the
 addenda of pinion and wheel are 8.7 mm and 3.7 mm respectively.

- b) Figure below shows a planetary gear train. Gears 2, 4 and 5 have 24, 60 and 144 teeth respectively. Gear 5 is fixed. Gear 2 is rotating clockwise at 700 rpm. Determine the speed of the arm and gear 4.



UNIT-IV

7. A horizontal gas engine running at 210rpm has bore of 220mm and stroke of 440mm. The connecting rod is 924mm along the reciprocating part weight 20kg, when the crank has turned through an angle of 30° from IDC. The gas pressure on the cover and crank side are 500 kN/m^2 & 60 kN/m^2 respectively. Diameter of piston rod is 40mm. Determine
- Turning moment on the crank shaft
 - Thrust on the bearing
 - Acceleration of flywheel which has mass of 8kg and radius of gyration is 600 mm while the power of engine as 22kW.

(OR)

- 8 The turbine rotor of a ship has a mass of 20 tones and a radius of gyration of 0.75 m. Its speed is 2000 rpm clockwise looking from stern. The ship pitches 6° above and below the horizontal position. The time period is 18 seconds. Determine the maximum gyroscopic couple and its effect when the bow is raising and also determine the maximum angular acceleration.

UNIT-V

9. a) The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, $1\text{ mm}=3\text{ N-m}$; crank angle, $1\text{ mm}=1^\circ$. The turning moment diagram repeats itself at every half revolution of the engine and areas above and below the mean turning moment line taken in order are 95, 85, 140, 40, 360, 170 mm^2 . The rotating parts are equivalent to a mass of 30 kg at a radius of gyration of 120mm. Determine the coefficient of fluctuation of speed when the engine runs at 1200r.p.m.

- b) A porter governor has all four arms 250mm long. The upper arms are pivoted on the axis of rotation and the lower arms are attached to the sleeve at a distance of 30mm from the axis. Each ball has a mass of 5.5kg and the sleeve mass is 50kg. If the extreme radii of rotation of the balls are 175mm and 210mm, determine the range of speed of the governor?

(OR)

- 10 A spring loaded (Hartnell) governor of the Hartnell type has equal arms. The balls rotate in a circle of 15 cm diameter when the sleeve is in the mid position and the ball arms are vertical. The equilibrium speed for this position is 500rpm. The maximum sleeve movement is to be 3cm and the maximum variation of speed taking in account the friction to be $\pm 6\%$ of the mid position speed. The mass of the sleeve is 5kg and the friction force may be considered to arise out of an equivalent 3kg mass at the sleeve. The power of the governor must be sufficient to overcome the friction by 1% change of speed either way from mid position. Determine the rotating masses.

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) With neat block diagram, Explain the process of Sampling and Quantization in pulse code modulation. 8M

- b) Derive the expression for the Quantization error for pulse code modulation. 4M

(OR)

2. a) Explain about differential pulse code modulation and write the differences between DPCM and ADPCM. 8M

- b) What is the need for companding? 4M

UNIT-II

3. a) The bit stream 1011100011 is to be transmitted using DPSK. Determine the encoded sequence and transmitted phase sequence. 6M

- b) Explain about DPSK system. And also give the comparison between DPSK and PSK 6M

(OR)

4. a) Draw and explain the operating principle of ASK Modulator. 6M

- b) Describe the BPSK modulation technique with the help of a neat diagram. 6M

UNIT-III

5. a) Explain in detail about binary PSK and derive the probability of error for binary PSK. 6M

- b) Draw and explain the working of optimum receiver with a neat diagram. 6M

(OR)

6. a) A voice grade channel of the telephone network has a bandwidth of 3.4KHz. Calculate the information capacity of the telephone channel for signal to noise ratio of 30dB. 6M

- b) One of the five possible messages Q1 to Q5 having probabilities 1/2, 1/4, 1/8, 1/16, and 1/16 respectively, is transmitted, calculate the average information. 6M

UNIT-IV

7. a) State and explain Shannon's Theorem. 6M

- b) Determine the Huffman coding for the following message with the probabilities of 0.4, 0.15, 0.15, 0.15, and 0.15. Find the efficiency. 6M

(OR)

8. a) Explain the bandwidth- S/N Trade off. 6M

- b) Explain the procedure for calculating syndrome, error detection and correction for linear block code. 6M

UNIT-V

9. a) Explain the transform domain approach to analysis of a convolutional encoder with an example. 8M

- b) Compare convolution codes with linear block codes 4M

(OR)

10. a) Develop convolution codes for the convolutional encoder with code rate $\frac{1}{2}$ and 3 shift register has tap gains $[g_0^1 \ g_1^1 \ g_2^1] = [1 \ 1 \ 1]$ and $[g_0^2 \ g_1^2 \ g_2^2] = [1 \ 0 \ 1]$ 8M

i) message sequence (1 1 0 1 0) using time domain approach.

ii) message sequence (1 0 0 1 1) using transform domain approach.

- b) Briefly explain Viterbi algorithm for decoding of convolutional codes. 4M

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SET-2

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

III B.Tech I Semester Regular & Supplementary Examinations, February-2022

SOFTWARE ENGINEERING

(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) What are Software Myths? Explain the customer myths. 6 M
b) How can you distinguish between user and system requirements? 6 M
- (OR)**
2. a) Explain the process of requirements elicitation. 6 M
b) Explain about the requirements management planning. 6 M

UNIT-II

3. a) Explain the incremental process model with advantages and disadvantages. 6 M
b) Discuss about the evolutionary process models. 6 M
- (OR)**
4. a) What are Behavioral models? Explain Data-flow models with an example. 6 M
b) List and explain the object models in brief. 6 M

UNIT-III

5. a) Explain different elements of the design model. 6 M
b) What is architecture? Explain the importance of architecture. 6 M
- (OR)**
6. a) List and explain the golden rules of user interface design. 6 M
b) Explain how to apply user interface design steps. 6 M

UNIT-IV

7. a) What is meant by unit testing? Explain the unit testing considerations and procedures. 6 M
b) What is Integration Testing? Explain top-down and bottom-up integration testing. 6 M
- (OR)**
8. a) Differentiate between white box testing and black box testing. 6 M
b) Explain about boundary value analysis. 6 M

UNIT-V

9. What is COCOMO-I model? And explain in detail. 12 M
- (OR)**
10. a) Explain the activities of Software Quality Assurance. 6 M
b) Explain the role of formal technical reviews in quality control? 6 M

AR16

CODE: 16CE3014

SET-1

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

III B.Tech I Semester Supplementary Examinations, February-2022

TRANSPORTATION ENGINEERING-I

(Civil 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) Explain in detail about second twenty year road plan. 7M
b) Briefly explain the engineering surveys needed for locating a new highway 7M
- (OR)**
2. a) Explain the necessity of highway planning in India 7M
b) Explain how the drawings and reports are maintained for highway alignment 7M

UNIT-II

3. Define super elevation and derive an expression for super elevation in detail. 14M
- (OR)**
4. Write a short note on design control and criteria of highway geometric design with brief explanation 14M

UNIT-III

5. a) Explain the procedure pavement design by Marshall stability method 7M
b) Write a short note on highway materials 7M
- (OR)**
6. a) Explain the necessity of tests on aggregates and bitumen 7M
b) Explain the requirements of bituminous mix design 7M

UNIT-IV

7. a) Discuss the relation between speed, density and flow with neat sketches. 7M
b) Explain briefly the various aspects investigated during parking studies. What are the uses of these studies? 7M
- (OR)**
8. a) Interpret the collision diagram and mention the significance of symbols in it. 7M
b) Write a short note on accident data recording. 7M

UNIT-V

9. a) Illustrate the criteria for selection of grade separated intersections 7M
b) Explain the design considerations of rotary elements. 7M
- (OR)**
10. a) Draw various Un-channelized intersection with traffic movements 7M
b) Appraise the Clover leaf intersection with advantages and disadvantages and application. 7M

AR16

CODE: 16ME3014

SET-1

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

III B.Tech I Semester Supplementary Examinations, February, 2022

KINEMATICS & DYNAMICS OF MACHINERY

(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. a) Explain different types of constrained motions with neat sketches. 6M
b) Explain any two approximate straight line mechanism with neat sketch 8M
- (OR)
2. a) What is inversion? 2M
b) Explain with neat sketch all inversions of double slider crank mechanisms. 12M

UNIT-II

3. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine: 14M
1. linear velocity and acceleration of the midpoint of the connecting rod, and
2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.
- (OR)
4. a) What is coriolis component of acceleration? How is it determined? 4M
b) In a pin jointed four bar mechanism, AD is fixed link. $AB = 300$ mm, $BC = CD = 360$ mm, and $AD = 600$ mm. The angle $BAD = 60^\circ$. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC. 10M

UNIT-III

5. The crank and connecting rod of a vertical petrol engine, running at 1800rpm are 60 mm and 270 mm respectively. The diameter of piston is 100mm and the mass of the reciprocating parts is 1.2kg. during the expansion stroke when the crank has turned 200° from the T.D.C, the gas pressure is 650 kN/m², Determine the 14M
 - i) Net force on the piston
 - ii) Net load on the gudgeon pin
 - iii) Thrust on the cylinder walls
 - iv) Speed at which the gudgeon pin load is reversed in direction

(OR)

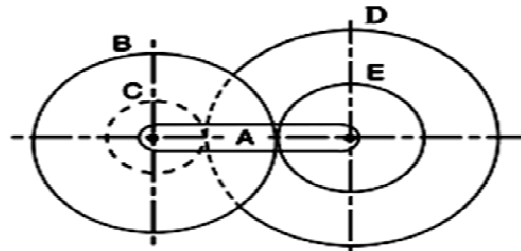
6. A ship is propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple and determine gyroscopic effects in the following conditions: 14M
1. The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.
 2. The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.
 3. The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern.
- Determine also the maximum angular acceleration during pitching.

UNIT-IV

7. A pair of gears, having 40 and 20 teeth respectively, are rotating in mesh, the speed of the smaller being 2000 r.p.m. Determine the velocity of sliding between the gear teeth faces at the point of engagement, at the pitch point, and at the point of disengagement if the smaller gear is the driver. Assume that the gear teeth are 20° involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pairs of teeth are in contact. Assume addendum as one module. 14M

(OR)

8. In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. 14M



UNIT-V

9. The torque delivered by two stroke engine represented by $T=1000+300 \sin 2\theta-500 \cos\theta$ N-m where θ is the angle made by the crank from IDC. The engine speed is 250rpm. The mass of flywheel is 400 kg and radius of gyration is 400mm. Determine: 14M
- i) Total percentage of fluctuation of speed.
 - ii) The angular acceleration of flywheel when the crank has rotated through an angle of 60° from IDC.
 - iii) The maximum angular retardation of flywheel.

(OR)

10. The arms of a Porter governor are 300 mm long. The upper arms are pivoted on the axis of rotation. The lower arms are attached to a sleeve at a distance of 40 mm from the axis of rotation. The mass of the load on the sleeve is 70 kg and the mass of each ball is 10 kg. Determine the equilibrium speed when the radius of rotation of the balls is 200 mm. If the friction is equivalent to a load of 20 N at the sleeve, what will be the range of speed for this position? 14M

AR16

CODE: 16EC3013

SET-1

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

III B.Tech I Semester Supplementary Examinations, February-2022

**DIGITAL COMMUNICATIONS
(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) What are the drawbacks of Delta Modulation System? Discuss Adaptive Delta Modulation System [7M]
- b) Draw the block diagram of PCM system and explain the function of each block in detail. [7M]

(OR)

2. a) Draw the block diagram of DPCM system and explain the function of each block in detail [7M]
- b) Define quantization? Derive an expression for Quantization error in PCM system. [7M]

UNIT-II

3. a) Define Matched filter and derive an expression for probability of bit error [7M]
- b) Compare PSK, DPSK and QPSK Signalling schemes with neat diagrams [7M]

(OR)

4. a) Derive an expression for probability of bit error for a BFSK system [10M]
- b) Draw the block diagram of BFSK modulator and Demodulator and explain their operations in detail. [4M]

UNIT-III

5. a) Calculate the band width limits of Shannon –Hartley theorem [8M]
- b) Explain the concept of amount of information and Entropy with its properties [6M]

(OR)

6. a) Define mutual information and give its properties [10M]
- b) Discuss Shannon- Fano and Huffman coding algorithms with an example and compare them [4M]

UNIT-IV

7. a) Write an algebraic structure of Binary Cyclic codes [8M]
- b) Explain the matrix representation of Linear Block codes [6M]

(OR)

8. a) Design a decoder with shift registers implementation by considering an example [7M]
- b) Explain about Block codes in which each block of k message bits encoded in to n bits with an example. [7M]

UNIT-V

9. a) Develop code tree in convolution codes [7M]
- b) What is Convolution codes. How it is generated? [7M]

(OR)

10. a) Explain the convolution codes using transform domain approach with an example. [7M]
- b) What are different decoding methods of convolution codes and explain them? [7M]

AR16

CODE: 16CS3013

SET-1

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

III B.Tech I Semester Supplementary Examinations, February, 2022

SOFTWARE ENGINEERING

(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) What are the advantages of layered technology? 7M
b) Give CMMI levels and explain? 7M
- (OR)**
2. a) Explain about Software myths? 7M
b) Discuss about process framework? 7M

UNIT-II

3. a) Discuss about Functional and non-functional requirements? 7M
b) Explain about User requirements and System requirements? 7M
- (OR)**
4. a) Explain about Requirements elicitation and analysis? 7M
b) Discuss about Requirements management? 7M

UNIT-III

5. a) Explain about Design process and Design quality? 7M
b) Discuss about Design model? 7M
- (OR)**
6. a) Explain about User interface analysis and design? 7M
b) Illustrate about Interface design steps? 7M

UNIT-IV

7. a) Discuss about test strategies for conventional software? 7M
b) Explain about Black-Box and White-Box testing? 7M
- (OR)**
8. a) Discuss about Metrics for Analysis Model? 7M
b) Explain about Metrics for Design Model? 7M

UNIT-V

9. What is COCOMO-I model? And explain in detail. 14M
- (OR)**
10. a) Explain the use of Software Reviews? 7M
b) Discuss about Formal Technical reviews? 7M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****III B.Tech I Semester Supplementary Examinations, February-2022****DYNAMICS OF MACHINERY****(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1.
 - a) Write expression for gyroscopic couple.
 - b) What is meant by uniform pressure theory or uniform wear theory for the friction torque of a bearing?
 - c) List out the few machines in which flywheel are used.
 - d) Define dynamic balancing
 - e) What is meant by sensitiveness of a governor?
 - f) State different methods of finding natural frequency of a system.
 - g) Define the hunting in governors.
 - h) Write the effect of precession motion on the stability of moving vehicles?
 - i) Classify the types of dynamometers?
 - j) What is the necessity of forced damped vibration?

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2.
 - a) Expression for the coefficient of fluctuation of speed. 6M
 - b) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 metres. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds. 6M
- (OR)**
3. The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows: + 52, - 124, + 92, - 140, + 85, - 72 and + 107 mm², when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed $\pm 1.5\%$ of the mean, find the necessary mass of the flywheel of radius 0.5 m. 12M

UNIT-II

4. The turbine rotor of a ship has a mass of 2.2 tonnes and rotates at 1800 rpm clockwise when viewed from the front. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when (i) the Ship turns right at a radius of 250 m with a speed of 25km/hr, (ii) Ship pitches with the bow rising at an angular velocity of 0.8 rad/s, (iii) Ship rolls at an angular velocity of 0.1 rad/s 12M

(OR)

5. a) Explain about the effect of precession motion on the stability of moving vehicles such as motor car? 6M
- b) The rotor of a marine turbine has a moment of inertia of 750 kg.m^2 and rotates at 3000rpm clockwise when viewed from aft. If the ship pitches with angular simple harmonic motion having a periodic time of 16 seconds and amplitude of 0.1 radian, find the (i) maximum angular velocity of the rotor axis (ii) maximum value of the gyroscopic couple. 6M

UNIT-III

6. a) Describe with a neat sketch the working of a single plate friction clutch. 5M
- b) Establish a formula for the maximum torque transmitted by a single plate clutch of external and internal radii r_1 and r_2 , if the limiting coefficient of friction is μ and the axial spring load is W . Assume that the pressure intensity on the contact faces is uniform. 7M

(OR)

7. a) A plain collar type thrust bearing having inner and outer diameters of 200 mm and 450 mm is subjected to an axial thrust of 40 kN. Assuming coefficient of friction between the thrust surfaces as 0.025, find the power absorbed in overcoming friction at a speed of 120 rpm. The rate of wear is considered to be proportional to the pressure and rubbing speed. 6M
- b) An effective diameter of the cone clutch is 75 mm. The semi-angle of the cone is 18° . Find the torque required to produce slipping of the clutch if an axial force applied is 200 N. This clutch is employed to connect an electric motor running uniformly at 100 r.p.m with a flywheel which is initially stationary. The flywheel has a mass of 13.5 kg and its radius of gyration is 150 mm. Calculate the time required for the flywheel to attain full speed, and also the energy lost in the slipping of the clutch. Take coefficient of friction as 0.3. 6M

UNIT-IV

8. Four masses A, B, C and D revolve at equal radii and equally spaced along a shaft. The mass B is 7kg and the radii of C and D make angles of 90° and 240° respectively with the radius of B. Find the Magnitude of masses A, C and D and angular position of A, so that the system may be completely balanced. 12M

(OR)

9. Four masses m_1 , m_2 , m_3 and m_4 having 100, 175, 200 and 25Kg are fixed to cranks of 20 cm radius and revolve in planes 1,2,3 and 4. The angular position of the cranks in planes 2,3 and 4 with respect to the crank in plane 1 are 75° , 135° and 200° taken in the same sense. The distance of planes 2,3 and 4 from plane 1 are 60cm, 186cm and 240 cm respectively determine the position and magnitude of the balance mass at radius of 60cm in plane L and M located at middle of the plane 1 and 2 and the middle of the planes 3 and 4 respectively. 12M

UNIT-V

10. A shaft is simply supported at the ends and is of 20 mm diameter and 600 mm length. The shaft carries a load of 19.62 N at its centre. The weight of the shaft per metre length is 250 N/m. Find the critical speed of the shaft. Take $E = 200 \text{ GN / m}^2$. 12M

(OR)

11. a) Derive an expression for the damping coefficient in terms of the circular frequency, mass of the vibrating body, and damping factor. 6M
- b) A shaft of 10 cm diameter and 100 cm long is fixed at one end and other end carries a flywheel of mass 80 kg. Taking young's modulus for the shaft material as $2 \times 10^6 \text{ kg/cm}^2$, find the natural frequency of longitudinal and transverse vibrations. 6M

AR13

CODE: 13EC3014

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, February-2022

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Mention the different types of noise effects in DM system.
b) Define quantization noise in PCM.
c) Draw the binary ASK waveform for the data 101110101 using bipolar signalling format.
d) Write the Matched filter probability of bit error expression.
e) Define Information rate.
f) Mention any two properties of mutual information.
g) Mention the purpose of parity check matrix.
h) Define hamming distance of linear block codes.
i) Define code efficiency of Convolution codes.
j) Mention the types of encoding procedures of Convolution codes.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Explain the importance of companding in PCM system. 6M
b) Draw and explain the block diagram of Adaptive Delta Modulation system. 6M

(OR)

3. a) What is Sampling? explain natural sampling. 6M
b) What is differential quantization and explain DPCM. 6M

UNIT-II

4. a) Derive the error probability of coherent BASK. 6M
b) Derive the probability of bit error expression in case of Optimum filter. 6M

(OR)

5. a) Draw and explain QPSK transmitter and receiver. 6M
b) Explain the process of encoding and detection of binary DPSK with binary data 1010011100. 6M

UNIT-III

6. a) State and explain the properties of Entropy. 6M
b) A DMS X has five symbols X_1, X_2, X_3, X_4 and X_5 with probabilities of occurrence 0.4, 0.19, 0.16, 0.15 and 0.1 respectively. Construct Shannon – Fano code for X and calculate efficiency. 6M

(OR)

7. a) State and explain properties of mutual information. 6M
 b) A DMS X has five symbols X_1, X_2, X_3, X_4 and X_5 with probabilities of occurrence 0.4, 0.19, 0.16, 0.15 and 0.1 respectively. Construct Huffman code for X and calculate efficiency 6M

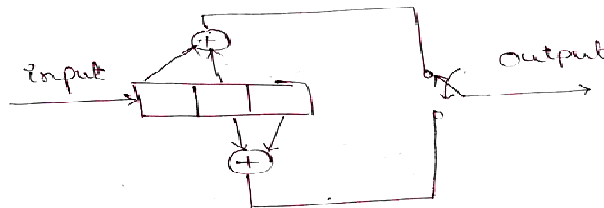
1 of 2

UNIT-IV

8. a) Explain error detection and error correction capabilities of Linear Block Codes. 6M
 b) Explain the Characteristics of Hamming codes. 6M
 (OR)
 9. a) Explain the concept of binary cyclic codes. 6M
 b) Explain the procedure to calculate syndrome in case of linear block codes. 6M

UNIT-V

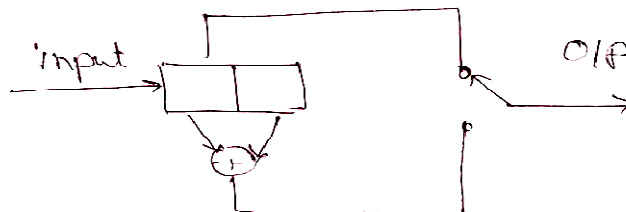
10. a) Explain the encoding of convolution codes in time domain approach. 6M
 b) Consider the convolution encoder shown in below figure. 6M



Find the impulse response of the encoder.

(OR)

11. a) Write the advantages and disadvantages of convolution codes. 6M
 b) Consider the convolution encoder shown in below figure. 6M



Find the output sequence if the input sequence is 101. Draw the state and tree diagrams of the encoder.

2 of 2

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Identify the tokens in the given statement: $a = b * c + b * c$.
b) Eliminate left recursion from the following grammar
 $E \rightarrow E+T \mid T$
 $T \rightarrow T*F \mid F$
 $F \rightarrow id \mid (E)$
c) What are the benefits of using machine-independent intermediate form?
d) Define constant folding.
e) What is the significance of operator precedence?
f) What is LL (1) grammar?
g) What is an activation record?
h) Define symbol tables?
i) What is semantic rule? How to evaluate the semantic rules?
j) Define code optimization?

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) What are the various phases of the compiler? Explain each phase in detail. 6M
b) Prepare a canonical parsing table for the grammar G given 6M
below
 $S \rightarrow CC$
 $C \rightarrow aC$
 $C \rightarrow b$

(OR)

3. a) Write about the role of lexical analyser. 6M
b) How to design a lexical analyser to identify strings, reserved words and identifiers. 6M

UNIT-II

4. a) Analyze whether the following grammar is LR (1) or not. 6M
Explain your answer with reasons.
 $S \rightarrow L, R$
 $S \rightarrow R$
 $L \rightarrow *R$
 $L \rightarrow id$
 $R \rightarrow L$
b) Discuss in brief about left recursion and left factoring with examples. 6M
- (OR)**
5. a) Explain recursive descent parser with an example. 6M
b) Construct the non-recursive predictive parse table for the given grammar and 6M
check the acceptance of input string 'abfcg' $S \rightarrow A A \rightarrow aB/Ad B \rightarrow bBC/f C \rightarrow cg$

UNIT-III

6. a) Briefly explain about symbol table. 6M
b) Explain Runtime Stack and Heap Storage allocation. 6M
- (OR)**
7. a) Construct three address code, quadruple, triple representation for the code segment $(a*b)+(c+d)-(a+b+c+d)$ 6M
b) Explain briefly 6M
i) S – attributed definition ii) L – attributed definition
iii) Dependency Graph

UNIT-IV

8. a) What is an activation record? Discuss its syntax. 6M
b) What is a flow graph? Explain how a program can be converted into a flow graph. 6M
- (OR)**
9. a) Construct DAG for the expression $(a*b) + (c-d) * (a*b) + b$. 6M
b) Explain loop optimization techniques. 6M

UNIT-V

10. a) Explain the concept of Object Code forms. 6M
b) Explain different machine dependent code optimization techniques? 6M
- (OR)**
11. a) Explain DAG for register allocation. 6M
b) Discuss about problems in code generation. 6M