

# AR18

**CODE: 18CET312**

**SET-2**

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

**III B.Tech I Semester Regular Examinations, March,2021**

**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. Define hydrologic cycle. Explain descriptive representation of hydrologic cycle and various processes involved in hydrologic cycle with neat sketch.. 12M
- (OR)
2. a) What do you understand by precipitation? Explain various types of precipitation. 6M  
b) Describe different types of rain gauges and explain anyone. 6M

## UNIT-II

3. a) Define Hydrograph. What are the components of Hydrograph? 6M  
b) What is run-off? What are the factors that affect the run-off from a catchment area? 6M
- (OR)
4. a) What do you understand by unit hydrograph? How is it derived? 6M  
b) Explain briefly about measurement of rainfall and its types. 6M

## UNIT-III

5. Derive an equation for coefficient of permeability (k) in confined aquifer for study radial flow to a well with neat sketch. 12M
- (OR)
6. a) Describe various properties of aquifers. 6M  
b) Describe various types of tube wells. 6M

## UNIT-IV

7. a) Explain the terms 'duty' and 'delta'. Derive the relationship between two. 6M  
b) Explain the direct measurement methods for consumptive use. 6M
- (OR)
8. Define irrigation. What are the different types of irrigation? Explain briefly any two of them with neat sketches. 12M

## UNIT-V

9. a) Compare Kennedy's and Lacey's silt theories. Why is Lacey's conception superior to that of Kennedy's? 6M  
b) What is a Cross Drainage Work. Explain different types of CDW's. 6M
- (OR)
10. a) How do you classify the types of canals? Explain any two. 6M  
b) Write the design procedure of irrigation canal using Kennedy theory. 6M

# AR18

**CODE: 18EET312**

**SET-2**

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

**III B.Tech I Semester Regular Examinations, March,2021**

## **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 different torques in measuring instrument with neat sketches. 6M
- b) Explain with the neat sketches the working of MI instrument and derive an expression for the deflecting torque. 6M

**(OR)**

2. a) What are the differences between MI and MC instruments. 6M
- b) A PMMC instrument has a coil of dimensions 10 mm x 8 mm. The flux density in the air gap is  $0.15 \text{ Wb/m}^2$ . If the coil is wound for 100 turns, carrying a current of 5 mA then calculate the deflecting torque. Calculate the deflection if the spring constant is  $0.2 \times 10^{-6} \text{ Nm/degree}$ . 6M

### **UNIT-II**

3. a) Draw the equivalent circuit and phasor diagram of a current transformer. 6M
- b) Derive the expression for ratio error and phase angle errors of current transformer. 6M

**(OR)**

4. a) Derive an expression for steady state deflection of EDM (Electro Dynamometer) type Wattmeter. 6M
- b) Using Phasor diagram explain the reactive power measurement in balanced and unbalanced systems. 6M

### **UNIT-III**

5. a) With Neat sketch outline the Construction features of single phase energy meter. 6M
- b) Explain the procedure to test the Energy meter performance using Phantom loading 6M

**(OR)**

6. a) Explain the construction and working of single phase dynamometer type power factor meter. 6M
- b) Describe in detail the working of trivector meter & maximum demand meter. 6M

### **UNIT-IV**

7. a) Explain why Wheatstone bridge be used for the measurement of medium range of resistance and derive the expression for bridge sensitivity of a whetstone bridge. 6M
- b) Derive the balance equation for Hay's bridge and draw phasor diagram. 6M

**(OR)**

8. a) Derive the balance equation for Schering's bridge and Give its applications. 6M
- b) Derive the balance equation for Anderson's bridge and draw phasor diagram. 6M

### **UNIT-V**

9. a) Explain the construction and working of Ballistic galvanometer. 6M
- b) Explain with circuit diagram calibration of ammeter by using a DC potentiometer. 6M

**(OR)**

10. a) Derive the expression for deflection of Flux Meter. 6M
- b) Explain the method of reversal to obtain B-H curve of a given magnetic material. 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**

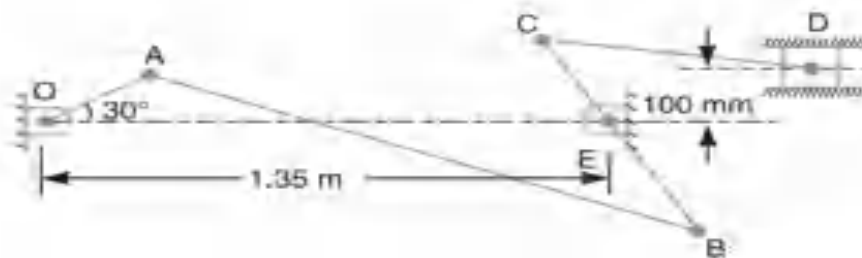
1. a) What is a machine ? Giving example, differentiate between a machine and a structure 4M
- b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. 8M

**(OR)**

2. a) Explain with a neat sketch describe the classification of kinematic pairs? 6M
- b) Sketch and Describe the Watt's and Peaucellier straight-line motion mechanisms. 6M

**UNIT-II**

3. a) A mechanism, as shown in Fig., has the following dimensions: OA = 200 mm; AB = 1.5 m; BC = 600 mm; CD = 500 mm and BE = 400 mm. Locate all the instantaneous centres. If crank OA rotates uniformly at 120 r.p.m. clockwise, find 1. The velocity of B, C and D, 2. the angular velocity of the links AB, BC and CD. 8M



- b) Explain how the velocities of a slider and the connecting rod are obtained in a slider crank mechanism. 4M
- (OR)**
4. a) 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: 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. 8M
  - b) State and prove Kennedy's theorem 4M

### UNIT-III

5. a) Sketch two teeth of a gear and show the following face, flank, top land, bottom land, addendum, dedendum tooth thickness, space width, face width and circular pitch. 6M
- b) How can you deduce the advantages of involutes systems over cycloid system 6M
- (OR)**
6. Two gear wheels mesh externally and are to give a velocity ratio of 3 to 1. The teeth are of involute form ; module = 6 mm, addendum = one module, pressure angle =  $20^\circ$ . The pinion rotates at 90 r.p.m. Determine : 1. The number of teeth on the pinion to avoid interference on it and the corresponding number of teeth on the wheel, 2. The length of path and arc of contact, 3. The number of pairs of teeth in contact, and 4. The maximum velocity of sliding. 12M

### UNIT-IV

7. a) Derive the expression for the velocity and acceleration of the piston? 6M
- b) In a slider crank mechanism, the length of the crank and connecting rod are 150 mm and 600 mm respectively. The crank position is  $60^\circ$  from inner dead centre. The crank shaft speed is 450 r.p.m. (clockwise). Using analytical method, determine: 1. Velocity and acceleration of the slider, and 2. Angular velocity and angular acceleration of the connecting rod 6M

**(OR)**

8. a) Explain the effect of gyroscopic couple on the aeroplanes with neat sketch? 6M
- b) A ship propelled by a turbine rotor which has a mass of 5000 kg and a speed of 2000rpm. 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 effect on the ship when the ship rolls at an angular velocity of 0.03 rad/s clockwise when viewed from stern 6M

### UNIT-V

9. The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm =  $3^\circ$  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 mm<sup>2</sup>, 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
- (OR)**
10. A Hartnell governor having a central sleeve spring and two right-angled bell crank levers moves between 290 rpm and 310 rpm for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and 120 mm respectively. The levers are pivoted at 120 mm from the governor axis and mass of each ball is 2.5 kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed. Determine Stiffness of the spring 12M

**DIGITAL COMMUNICATIONS  
(Electronics and Communication 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) Compare PCM and DM systems. 6
- b) Draw the block diagram of digital communication system and explain each block. 6

**(OR)**

2. a) Derive the signal to quantization ratio in Delta Modulation? 6
- b) A DM system can handle message signals of bandwidth up to 5 kHz and has a sampling rate of 50 kHz. A sinusoidal signal of 1.5 volts peak amplitude and frequency 2 kHz is applied to the system. Determine i) the step-size  $\Delta$  required to avoid slope overload ii) the  $(S/N)_q$  for the system for the given sinusoidal signal. 6

**UNIT-II**

3. a) Examine the working of BFSK modulator and non-coherent detector for bit stream 11010001 with neat diagrams. 6
- b) Draw the power spectrum of BPSK and BFSK signals. 6

**(OR)**

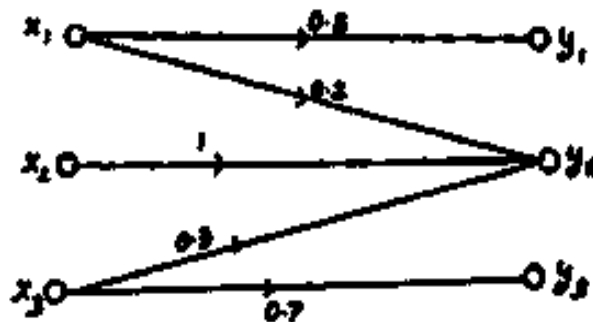
4. a) Describe the process of detecting DPSK signals. 6
- b) Illustrate the Generation and Detection of BPSK Signals with the help of Block Diagram and mathematical descriptions. 6

**UNIT-III**

5. a) Calculate the probability of error for a coherent BPSK receiver. 6
- b) Define Entropy and write down its properties. 6

**(OR)**

6. a) A received signal is either +2V or -2V hold for a time T. The signal is corrupted by two-sided white Gaussian noise power spectral density  $10^{-4}$  W/Hz. If the signal is processed by an integrate and dump receiver, what is the minimum time T during which a signal must be sustained if the probability of error is not exceed  $10^{-4}$  6
- b) Given  $P(x_1) = 0.2$ ,  $P(x_2) = 0.5$  and  $P(x_3) = 0.3$ . Find the mutual information for the channel shown in the following figure. 6



### UNIT-IV

7. a) For a source which can generate 8 messages whose probabilities are 0.25, 0.25, 0.15, 0.10, 0.10, 0.05, 0.05 and 0.05, Obtain the Shannon Fano code. Calculate efficiency of coding. 6
- b) The (6,3) Generator matrix 'G' of linear block code is given by 6

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

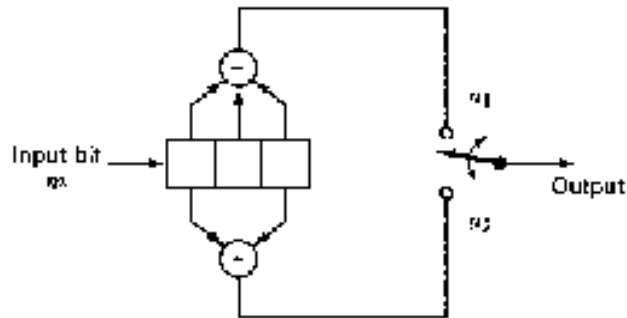
- i) Find all code vectors of this code  
ii) Find Parity check matrix

(OR)

8. a) State and Derive Shannon Hartley Theorem. 6
- b) The Generator polynomial of (6,3) cyclic code is  $G(P) = P^3 + P^2 + 1$ . Find all code vectors in systematic form. 6

### UNIT-V

9. A convolutional encoder is shown in Figure.1. Draw the code tree of it. 12



**Figure.1**

(OR)

10. Draw the state diagram, tree diagram, and trellis diagram for  $k=3$ , rate 1/3 code generated by  $g_1(x) = 1+x^2$ ,  $g_2(x) = 1+x$  and  $g_3(x) = 1+x+x^2$ . 12

# AR18

**CODE: 18CST311**

**SET-2**

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

**III B.Tech I Semester Regular Examinations, March,2021**

**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) Discuss changing nature of software. 6M  
b) Explain functional requirements with suitable examples. 6M
- (OR)
2. a) Explain the structure of Software Requirements document. 6M  
b) What are the feasibility studies for requirements engineering process? 6M

## UNIT-II

3. a) Explain waterfall model with an example. 6M  
b) Discuss about Incremental process model. 6M
- (OR)
4. a) Write short notes on Inheritance models. 6M  
b) Describe the importance of Data Models. Draw the ER diagram for Flight Management System 6M

## UNIT-III

5. a) Write any two goals of Design. Discuss various Design Concepts. 6M  
b) Explain the purpose of Architectural context diagram. 6M
- (OR)
6. a) Write about architectural styles and patterns 6M  
b) Explain interface analysis and interface design steps. 6M

## UNIT-IV

7. What do you mean by System Testing ? Explain in detail. 12 M
- (OR)
8. a) Differentiate between Black Box Testing and White Box Testing. 6M  
b) Write short notes on Integration Testing 6M

## UNIT-V

9. a) Explain about the metrics for source code ? 6M  
b) What are size oriented and function oriented metrics explain ? 6M
- (OR)
10. a) Explain about Formal Technical Reviews in detail ? 6M  
b) Explain i)Software Reliability ii)Software Safety 6M

**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

Design charts are allowed

Assume any required data

**UNIT-I**

- |             |    |  |    |
|-------------|----|--|----|
| 1.          | a) | Write the salient features of Nagpur Plan and Bombay Plan                      | 7  |
|             | b) | Explain different road network patterns with neat sketch                       | 7  |
| <b>(OR)</b> |    |  |    |
| 2.          | a) | Explain about the engineering surveys to be carried out for highway alignment. | 10 |
|             | b) | What are the factors affecting highway alignment                               | 4  |

**UNIT-II**

- |             |  |  |    |
|-------------|--|--|----|
| 3.          | A valley curve is formed when a descending gradient on 1 in 45 which meets an ascending gradient of 1 in 35. Design the total length of the valley curve, if the design speed is 90kmph so as to fulfill both comfort condition and head light sight distance for night driving? |  | 14 |
| <b>(OR)</b> |  |  |    |
| 4.          | a)   | Define super elevation and derive an expression for super elevation. | 7  |
|             | b)   | What are the types of transition curves.                             | 7  |

**UNIT-III**

- |             |    |   |   |
|-------------|----|---|---|
| 5.          | a) | What are the properties of bitumen.                                     | 9 |
|             | b) | Characterize the materials for highway construction according to MORTH. | 5 |
| <b>(OR)</b> |    |   |   |
| 6.          | a) | Explain any two tests on aggregates performed in laboratory.            | 6 |
|             | b) | Explain the procedure for marshal stability test on bitumen mix.        | 8 |

**UNIT-IV**

- |             |    |   |   |
|-------------|----|---|---|
| 7.          | a) | Give relationships between volume, density and speed. | 8 |
|             | b) | Explain parking surveys.                              | 6 |
| <b>(OR)</b> |    |   |   |
| 8.          | a) | What is collision diagram? Explain with symbols       | 6 |
|             | b) | Write a short note on accident data recording.        | 8 |

**UNIT-V**

- |             |    |  |   |
|-------------|----|--|---|
| 9.          | a) | Write about Design procedure of a rotary intersection.                                   | 7 |
|             | b) | Draw the sketches of various types of grade separated intersection. Write its advantages | 7 |
| <b>(OR)</b> |    |  |   |
| 10.         | a) | Draw various Un-channelized intersection with traffic movements                          | 7 |
|             | b) | What are the types of intersections.   | 7 |



# AR16

**CODE: 16EE3015**

**SET-2**

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

**III B.Tech I Semester Regular & Supplementary Examinations, March-2021**

## **ELECTRICAL MEASUREMENTS (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. a) What are the differences between MI and MC instruments. 6M  
b) A PMMC voltmeter has 200 turns of enamelled copper wire wound on a square frame which has a length of 2.5 cm and the flux density in the air gap is 0.06 Tesla. Calculate the deflection of the coil when it carries a current of 20mA. The control spring provides a torque of  $1.2 \times 10^{-6}$  newtons per degree deflection. 8M
- (OR)**
2. Write briefly about the controlling Torque, Deflection Torque and Damping Torque in PMMC Analog Instruments 14M

### **UNIT-II**

3. a) Explain the construction and principle of operation of a dynamometer type wattmeter. 10M  
b) Describe method of extending range of wattmeter using instrument transformers? 4M
- (OR)**
4. a) Explain the special features incorporated in a normal electro-dynamo meter wattmeter to make it as LPF wattmeter. 8M  
b) Write briefly about ratio error and phase angle error in Instrument Transformers 6M

### **UNIT-III**

5. a) Explain principle of working of single-phase induction type energy meter? Derive the expression relating number of revolutions and energy? 10M  
b) What is meant by phantom loading in wattmeters? 4M
- (OR)**
6. a) Explain the Principle of operation of any one power factor meter, derive relevant expressions 10M  
b) The current coil of a dynamometer wattmeter is connected to a 24V DC source in series with a  $6\Omega$  resistor. The potential circuit is connected through an ideal rectifier in series with a 50 Hz source of 100 V. The inductance of pressure circuit and current coil resistance are negligible. Compute the reading of the wattmeter. 4M

#### **UNIT-IV**

7. a) Derive the expression for bridge sensitivity of a wheat stone bridge with equal arms? Find the expression for current through the galvanometer for a small unbalance. 8M
- b) Derive the equation for balance in the case of Hay's bridge? And draw the phasor diagram? 6M
- (OR)**
8. a) Derive the equation for balance in the case of Anderson's bridge? And draw the phasor diagram? 6M
- b) With a neat sketch explain the resistance measurement using Kelvins double bridge and derive the expression for unknown resistance? 8M

#### **UNIT-V**

9. a) Mention the applications of D.C. and A.C. potentiometers? 6M
- b) Describe with the help of suitable diagrams, how a D.C potentiometer can be used for i) Calibration of Voltmeter ii) Calibration of wattmeter 8M
- (OR)**
10. a) Describe the salient features of Crompton's DC potentiometer? 4M
- b) Explain the Principle of operation of Drysdale polar potentiometer? 10M

2 of 2

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**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 constrained motions with neat sketches? 6 M
  - b) What is the inversion of mechanism? Explain all the inversions of double slider crank chain with neat sketches. 8 M
- (OR)**
2. a) Explain Hart's mechanism and prove that it transmits exact straight line motion? 7 M
  - b) Define mechanism and machine. Explain the Whitworth quick return motion mechanism with neat sketch? 7 M

**UNIT-II**

3. A mechanism of a crank and slotted lever quick return motion is shown in Fig.1. If the crank rotates counter clockwise at 120 r.p.m., determine for the configuration shown, the velocity and acceleration of the ram D. Also determine the angular acceleration of the slotted lever. Crank, AB = 150 mm ; Slotted arm, OC = 700 mm and link CD = 200 mm. 14M

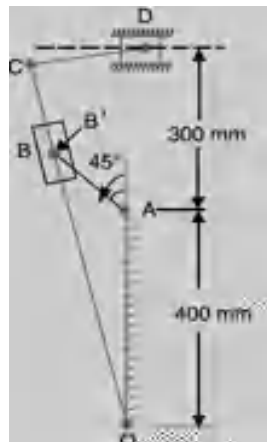


Figure 1  
1 of 4

(OR)

4. a) State the Kennedy's theorem? Locate all the instantaneous 7M  
centers of the slider crank mechanism as shown in Fig.2. The  
lengths of crank  $OB$  and connecting rod  $AB$  are 100 mm and  
400 mm respectively. If the crank rotates clockwise with an  
angular velocity of 10 rad/s, find: 1. Velocity of the slider  $A$ ,  
and 2. Angular velocity of the connecting rod  $AB$ .

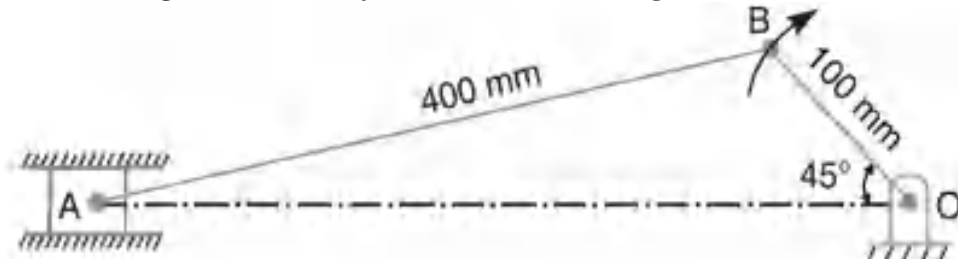


Figure 2

- b) In a slider crank mechanism, the length of crank  $OB$  and 7M  
connecting rod  $AB$  are 125 mm and 500 mm respectively. The  
centre of gravity  $G$  of the connecting rod is 275 mm from the  
slider  $A$ . The crank speed is 600 r.p.m. clockwise. When the  
crank has turned  $45^\circ$  from the inner dead centre position,  
determine: 1. velocity of the slider  $A$ , 2. velocity of the point  
 $G$ , and 3. angular velocity of the connecting rod  $AB$ .

### UNIT-III

5. a) Derive an expression for the angular acceleration of the 7M  
connecting rod of a reciprocating engine?  
b) What do you mean by spin, precession and gyroscopic planes 7M  
and derive the Gyroscopic couple?

(OR)

6. a) The turbine rotor of a ship has a mass of 3500 kg. It has a 7M  
radius of gyration of 0.45 m and a speed of 3000 r.p.m.  
clockwise when looking from stern. Determine the  
gyroscopic couple and its effect upon the ship:  
1. When the ship is steering to the left on a curve of 100 m  
radius at a speed of 36 km/h.  
2. When the ship is pitching in a simple harmonic motion,  
the bow falling with its maximum velocity. The period  
of pitching is 40 seconds and the total angular  
displacement between the two extreme positions of  
pitching is 12 degrees.  
b) Derive the total Gyroscopic couple acting on two wheeler 7M  
when it takes a turn?

## UNIT-IV

7. a) Derive the expression for law of gearing? 4M
- b) 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  $20^\circ$  involute form, addendum length is 5 mm and the module is 5 mm. 10M
- Also find the angle through which the pinion turns while any pairs of teeth are in contact.

(OR)

8. a) Explain the differential gear of an automobile with neat sketch? 4M
- b) In a reverted gear train, as shown in Fig. 3, two shafts A and B are in the same straight line and are geared together through an intermediate parallel shaft C. The gears connecting the shafts A and C have a module of 2 mm and those connecting the shafts C and B have a module of 4.5 mm. The speed of shaft A is to be about but greater than 12 times the speed of shaft B, and the ratio at each reduction is same. Find suitable number of teeth for gears. The number of teeth of each gear is to be a minimum but not less than 16. Also find the exact velocity ratio and the distance of shaft C from A and B 10M

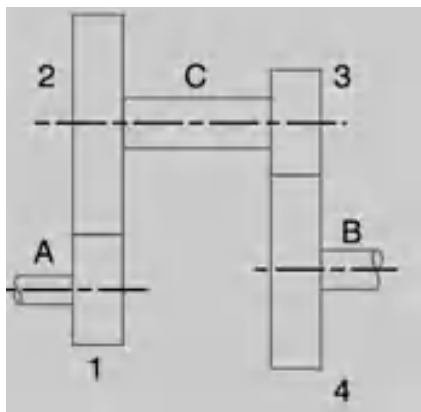


Fig.3

## UNIT-V

9. a) Explain the turning moment diagram of multi cylinder engine with neat sketch. 4M
- b) A spring loaded governor of the Hartnell type has arms of equal length. The masses rotate in a circle of 130 mm diameter when the sleeve is in the mid position and the ball arms are vertical. The equilibrium speed for this position is 450 r.p.m., neglecting friction. The maximum sleeve movement is to be 25 mm and the maximum variation of speed taking in account the friction to be 5% of the mid position speed. The mass of the sleeve is 4 kg and the friction may be considered equivalent to 30 N at the sleeve. The power of the governor must be sufficient to overcome the friction by one per cent change of speed either way at mid-position. Determine, neglecting obliquity effect of arms ; **1.** The value of each rotating mass: **2.** The spring stiffness in N/mm ; and **3.** The initial compression of spring. 10M

**(OR)**

10. a) Explain the Isochronism of governors? 4M
- b) A multi-cylinder engine is to run at a speed of 600 r.p.m. On drawing the turning moment diagram to a scale of 1 mm = 250 N-m and 1 mm = 3°, the areas above and below the mean torque line in mm<sup>2</sup> are : + 160, – 172, + 168, – 191, + 197, – 162 The speed is to be kept within  $\pm 1\%$  of the mean speed of the engine. Calculate the necessary moment of inertia of the flywheel. Determine the suitable dimensions of a rectangular flywheel rim if the breadth is twice its thickness. The density of the cast iron is 7250 kg/m<sup>3</sup> and its hoop stress is 6 MPa. Assume that the rim contributes 92% of the flywheel effect. 10M

# AR16

**CODE: 16EC3013**

**SET-2**

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

**III B.Tech I Semester Regular & Supplementary Examinations, March-2021**

**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) With the help of neat diagrams, Explain DPCM. 7M
- b) Describe the block diagram of digital communication system. 7M

**(OR)**

2. a) Explain quantization error and derive an expression for maximum SNR in PCM system that uses uniform quantization. 7M
- b) In a binary PCM system, the output signal to quantizing noise ratio is to be held to a minimum value of 40dB. Determine the number of levels and find the corresponding signal to quantizing noise ratio. 7M

## **UNIT-II**

3. a) The bit stream 1011100011 is to be transmitted using DPSK. Determine the transmitted sequence and encoded sequence. 7M
- b) Draw the block diagram of a QPSK receiver and explain its working. 7M

**(OR)**

4. a) Derive the expression for probability of error for non-coherent BFSK. 7M
- b) Derive the expression for probability of error for matched filter. 7M

## **UNIT-III**

5. a) Explain the concept of amount of information and its properties. 7M
- b) A discrete source emits one of five symbols once every millisecond. The symbol probabilities are 1/2, 1/4, 1/8, 1/16 and 1/16 respectively. Find the source entropy and information rate. 7M

**(OR)**

6. a) State the Shannon's source coding theorem and derive the expression for coding efficiency. 7M
- b) A discrete memory less source produces symbols  $x_i$ , where,  $i = 0$  to 5 with the following probabilities:  $p(x_0)=0.1$ ;  $p(x_1)=0.2$ ;  $p(x_2)=0.15$ ;  $p(x_3)=0.09$ ;  $p(x_4)=0.20$ ;  $p(x_5)=0.26$ ; Design the Huffman code for the above source and find the coding efficiency. 7M

## **UNIT-IV**

7. a) Write short notes on 'Hamming codes'. 7M
- b) Draw the block diagram of the syndrome calculator for an  $(n, k)$  cyclic code and explain its working. 7M

**(OR)**

8. a) Explain matrix description of linear block codes. 7M
- b) Design an encoder for the  $(7,4)$  binary cyclic code generated by  $g(x) = 1 + x + x^3$  and verify its operation using the message vector  $(0\ 1\ 0\ 1)$ . 7M

## **UNIT-V**

9. a) Explain time domain approach in encoding of convolutional codes. 7M
- b) Discuss the advantages and disadvantages of convolution codes over block codes. 7M

**(OR)**

10. a) Draw the state diagram, tree diagram, and trellis diagram for  $k=3$ , rate  $1/3$  code generated by  $g_1(x) = 1+x^2$ ,  $g_2(x) = 1+x$  and  $g_3(x) = 1+x+x^2$ . 7M
- b) Describe Viterbi algorithm method of decoding convolution code. 7M

# AR16

CODE: 16CS3013

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Regular & Supplementary Examinations, March-2021

## 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) State in your own words, the process umbrella activities in connection with software development. 7
- b) How the framework activities, actions and tasks that occur within each activity are organized with respect to sequence and time? 7
- (OR)
2. a) Identify advantages and disadvantages of waterfall model. 7
- b) Discuss spiral model with neat diagram. 7

### UNIT-II

3. a) Distinguish between the terms inception, elicitation and elaboration with reference to requirements. 7
- b) Give the steps involved in initiating requirements engineering. 7
- (OR)
4. a) What is requirement elicitation? Briefly describe the various activities performed in requirements elicitation with an example of a watch system that facilitates to set time and alarm and assess. 7
- b) Discuss about the requirement management planning. 7

### UNIT-III

5. a) Explain about software architecture design, with emphasize as fan in, fan-out, coupling, cohesion and factoring. 7
- b) Write short notes on design quality. 7
- (OR)
6. Explain about User Interface Design of software with an example and neat sketch. 14

### UNIT-IV

7. a) Analyse on equivalence partitioning. List rules used to define valid and invalid equivalence classes. explain the technique using examples. 7
- b) Examine how Black-Box testing used in better software development? 7
- (OR)
8. a) Explain in detail about the importance of COCOMO II model. 7
- b) Analyse the test strategies for conventional software for only Validation testing. 7

### UNIT-V

9. a) What is Software Quality Assurance? Explain various functions of SQA 7
- b) Explain i) software reliability ii) software safety 7
- (OR)
10. a) Analyse on the concept of risk Projection. 7
- b) Explain in detail about risk identification. 7



**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****III B.Tech I Semester Supplementary Examinations, March-2021****DYNAMICS OF MACHINERY  
(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Define active and reactive gyroscopic couple and torque.  
b) What is meant by the expression of friction circle?  
c) List and two function of governors and its examples.  
d) What is meant by balancing of rotating masses?  
e) List and two causes and effect of vibration.  
f) Why rotating masses are to be dynamically balanced?  
g) How governors are classified?  
h) Explain the terms: friction circle and friction axis  
i) Differentiate between governor and fly wheel  
j) Define frequency and free vibration.

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

2. In a turning moment diagram the areas above and below the mean torque line taken in order are +5.81, -3.23, +3.87, -5.16, +1.94, -3.87, +2.58, and -1.94 sq-cm respectively. The scales of the turning moment diagram are: Turning moment 1 cm is equal to 700 kg/m Crank angle 1 cm is equal to 60 deg. The mean speed of engine is 1200 rpm and the variation of speed must not exceed  $\pm 3$  percent of the mean speed. Assuming the radius of gyration of the flywheel to be 106.67 cm, find the weight of flywheel to keep the speed within the given limits. 12M

**(OR)**

3. a) Define fluctuation of energy and what is the maximum fluctuation of energy. 6M  
b) Expression for the coefficient of fluctuation of energy. 6M

**UNIT-II**

4. a) Explain the effect of Gyroscopic couple on a Naval ship during pitching. 6M  
b) Explain in what way the gyroscopic couple effects the motion of an aircraft while taking a turn. 6M

**(OR)**

- 5 The rotor of the turbine of a ship makes 1500 rpm clockwise when viewed from the stern. The rotor has a mass of 800 kg and its radius of gyration is 300 mm. Find the maximum gyro-couple transmitted to the hull when the ship pitches with maximum angular velocity of 1 rad/s. 12M

**UNIT-III**

6. a) Which of the two assumptions-uniform intensity of pressure or uniform rate of wear, would you make use of in designing friction clutch and why? 5M
- b) A cone clutch with cone angle  $20^\circ$  is to transmit 7.5 kW at 750 rpm. The normal intensity of pressure between the contact faces is not to exceed  $0.12\text{N/mm}^2$ . The coefficient of friction is 0.2. If face width is  $1/5$ th of mean diameter, find: 7M
- (i) The main dimensions of the clutch and
- (ii) Axial force required while running.

**(OR)**

7. a) A simple band brake is operated by a lever of length 450 mm. The brake drum has a diameter of 600 mm, and the brake band embraces  $5/8$  the of the circumference. One end of the band is attached to the fulcrum of the lever while the other end is attached to a pin on the lever 120 mm from the fulcrum. The effort applied to the end of the lever is 2 kN, and the coefficient of friction is 0.30. Find the maximum braking torque on the drum. 7M
- b) Explain about epicyclic train dynamometer with neat diagram? 5M

**UNIT-IV**

8. Four masses  $M_1$ ,  $M_2$ ,  $M_3$  and  $M_4$  are 200kg, 300kg, 240kg and 260kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively and the angle between successive masses are  $45^\circ$ ,  $75^\circ$  and  $135^\circ$ . Find the position and magnitude of balance mass required if its radius of rotation is 0.25m. 12M

**(OR)**

9. a) Explain the terms: variation of tractive force, swaying couple, and hammer blow. 6M
- b) Three masses P, Q and R with masses 12 kg, 11 kg and 18 kg respectively revolve in the same plane at radii 120 mm, 144 mm and 70 mm respectively. The angular position of Q and R are  $60^\circ$  and  $135^\circ$  from P. Determine the position and magnitude of mass S at radius 152 mm to balance the system. 6M

**UNIT-V**

10. Derive an expression for the natural frequency of the free longitudinal vibration by (i) Equilibrium method, (ii) Energy method, (iii) Rayleigh's method. 12M
- (OR)**
11. a) Derive an equation for the natural frequency of free transverse vibration of a shaft headed with a number of concentrated loads, by energy method. 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

**COMPILER DESIGN  
(Common to CSE & IT)****PART-A****ANSWER ALL QUESTIONS****[1 X 10 = 10M]**

1. a) State the phases of a compiler
- b) What is the role of Lexical analyzer?
- c) Define Parser.
- d) Define ambiguous grammar
- e) Mention the types of LR parser
- f) Define bottom up parsing?
- g) What is an activation record?
- h) What are applications of DAG?
- i) Define code optimization
- j) Specify the characteristics of Peephole optimization

**PART – B****Answer one question from each unit****[5 X 12 = 60M]****UNIT – I**

2. (a) Distinguish between pass and phase of a compiler [6M]
- (b) Draw a block diagram of phases of a compiler and indicate the main functions of each phase. [6M]

**(OR)**

3. (a) Briefly explain about bootstrapping. [6M]
- (b) Differentiate between tokens, patterns, lexeme. [6M]

**UNIT- II**

4. (a) Construct the LALR parsing table for the grammar given below [6M]  
S → L = R / R  
L → \* R / id  
R → L
- (b) Compare top down parsing and bottom up parsing methods. [6M]

**(OR)**

5. (a) Verify whether the following grammar is LL(1) or not? [8M]  
 $E \rightarrow E + T \mid T$   
 $T \rightarrow T * F \mid F$   
 $F \rightarrow (F) \mid a \mid b$   
(b) Write short notes on YACC [4M]

**UNIT - III**

6. (a) Write Syntax directed definition for constructing syntax tree of an expression derived from the grammar [6M]  
 $E \rightarrow E + T \mid E - T \mid T \mid T * T \mid id \mid num$   
(b) What is a three address code? Mention its types. How would you implement three address statements? Explain with suitable examples. [6M]

**(OR)**

7. (a) What are different storage allocation strategies. Explain in detail. [8M]  
(b) Explain S-attributed definition. [4M]

**UNIT - IV**

8. (a) Explain with suitable example various sources of loop optimization. [6M]  
(b) Draw the DAG for the expression  $(a*b) + (c-d) * (a*b) + b$ . [6M]

**(OR)**

9. (a) Discuss how copy propagation can be done using data flow equation. [6M]  
(b) Discuss about Data flow analysis. [6M]

**UNIT - V**

10. Explain in detail register and assignment generic code generation algorithms. [12M]

**(OR)**

11. (a) Discuss about machine dependent code optimization techniques. [6M]  
(b) Discuss about DAG for register allocation. [6M]