

III B. Tech I Semester Regular Examinations, October/November - 2018
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
IS: 456 – 2000 & Column interaction diagrams only from SP-16 are to be Provided to the student in the
Examination hall.

PART –A

- 1 Design a continuous RC slab for a hall 7m and 14m long. The slab is supported on RCC beams each 300mm wide which are monolithic. The ends of the slab are supported on walls. 300mm wide. Design the slab for a live load of 3 kN/m^2 . Assume the weight of roof finishing equal to 1.0 kN/m^2 . Use M20 concrete and Fe 415 steel. [28M]
 a) Draw the reinforcement of the slab in plan view.
 b) Draw cross section of the slab including beams with reinforcement details.

(OR)

- 2 The T beam floor consists of 12cm thick R.C. slab monolithic with 30cm wide beams. [28M]
 The beams are spaced at 3.5m center to center and their effective span is 8m. If the superimposed on the slab is 6.5 kN/m^2 , design an intermediate beam Use M25 mix and FE 415 grade steel.
 a) Longitudinal section showing the reinforcement details.
 b) The cross section of the beam at salient points, showing reinforcement details

PART -B

- 3 A rectangular beam section is 20cm wide and 35 cm deep up to the center of tension steel, which consist of 4-16mm TOR bars. Find the position of the neutral axis, the lever arm, forces of compression and tension, cracking moment and safe moment of resistance of concrete is of M20 mix and steel is of Fe500 grade. [14M]
- 4 The flange of a T beam flange of the beam is 90 cm x 12cm and web below is 30cm x 40cm. It is reinforced with 4-25 mm plus 4-12mm Fe 415 steel bars in tension at an effective cover of 50mm. Determine the shear reinforcement needed for a shear force of 250kN (i) If the mix is M20 and (ii) if the mix is M25. Take load factor = 1.5. [14M]
- 5 Design a square spread footing to carry a column of 1800kN from a 60 cm square tied column containing 25mm bars as the longitudinal reinforcement. The bearing capacity of soil is 180 kN/m^2 . Consider base of footing as 1m below the ground level. The unit weight of earth is 20 kN/m^3 . Use $\sigma_y = 415 \text{ N/mm}^2$ and $\sigma_{ck} = 20 \text{ N/mm}^2$. [14M]



- 6 a) What is the minimum percentage of steel allowed in a RC column. Explain why it is necessary to specify the minimum percentage. [14M]
- b) A column 230 mm x 350 mm is reinforced with 4 bars 20mm one at each corner effective cover of 50mm. It is loaded with characteristic load = 340 kN. Factored Moment in the direction of larger dimension $M_{ux} = 30$ kNm. Factored Moment in the direction of shorter dimension $M_{uy} = 18$ kNm. About Y axis bisecting the width. Assume concrete grade M 20 and steel grade Fe 415 steel. Check the safety of the column.
- 7 Write short notes on [14M]
- i) Reason to design as a under reinforced section
 - ii) Diagonal tension
 - iii) Torsion provisions in beams
 - iv) Uniaxial and Biaxial bending in columns



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PART –A

- 1 The T beam floor consists of 12cm thick R.C. slab monolithic with 30cm wide beams. The beams are spaced at 3.0m center to center and their effective span is 7.5m. If the superimposed on the slab is 6kN/m^2 , design an intermediate beam. Use M20 mix and FE 415 grade steel. Draw to scale [28M]
 a) Longitudinal section showing the reinforcement details.
 b) The cross section of the beam at salient points, showing reinforcement details

(OR)

- 2 Design a continuous RC slab for a hall 4 m wide and 12 m long supported on floor beams spaced at 3m c/c. Design the slab for a live load of 2.5 kN/m^2 . Use M20 concrete and Fe 415 steel. [28M]
 a) Draw the reinforcement of the slab in plan view
 b) Draw cross section of the slab including beams with reinforcement details.

PART -B

- 3 A beam section is 230 mm wide and 400 mm deep is reinforced with tension reinforcement 2000mm^2 at an effective cover of 30 mm. Determine the ultimate moment of resistance of beam section. Use M20 mix and steel is of Fe 415 grade steel. [14M]
- 4 a) What are the assumptions for the design of a reinforced concrete section for limit state of collapse in bending? [7M]
 b) Show that the limiting depth of neutral axis for a rectangular cross section reinforced with FE415 grade steel in $0.48d$. [7M]
- 5 An RC beam has an effective depth of 450mm and breadth of 250mm. It contains 4-25mm bars mild steel out of which two bars are bent up at 30 degrees near the support in tension. Calculate the shear resistance of the bent up bars. What additional stirrups are needed if it has to resist a design shear force of 150 kN. Use M20 mix. [14M]
- 6 Design an isolated square column 400mm x 400mm reinforced with 6 - 20mm diameter bars carrying a service load of 1400 kN The bearing capacity of soil is 200 kN/m^2 at a depth of 1.5m below ground. The footing is restricted to 2.0m in one direction Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column. [14M]



- 7 The section of a cantilever beam designed for a span of 4.0m is having dimensions [14M]
300 x 600mm with 3 numbers 20mm diameter bars in compression and 3 numbers
16mm diameter bars in tension. The beam has been designed for a bending moment
of 170kNm (at support) under service loads, of which 65 percent is due to
permanent (dead) loads. The loading is uniformly distributed on the span. Assume
M20 concrete and Fe 415 steel.
- i) Calculate the maximum short-term deflection
 - ii) The short-term deflection due to live loads alone.



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Examination hall.

PART –A

- 1 Design a continuous RC slab for a hall 6.5m and 13.5m long. The slab is supported on RCC beams each 240mm wide which are monolithic. The ends of the slab are supported on walls. 300mm wide. Design the slab for a live load of 2 kN/m². Assume the weight of roof finishing equal to 1.5 kN/m². Use M15 concrete and Fe 415 steel. [28M]
 i) Draw the reinforcement of the slab in plan view
 ii) Draw cross section of the slab including beams with reinforcement details.

(OR)

- 2 A T beam floor consists of 12cm thick R.C. slab monolithic with 30cm wide beams. The beams are spaced at 4.0m center to center and their effective span is 7.5m. If the superimposed on the slab is 7.0 kN/m², design an intermediate. Use M20 mix and TMT 415 grade steel .draw to scale [28M]
 a) Longitudinal section showing the reinforcement details.
 b) The cross section of the beam at salient points, showing reinforcement details

PART -B

- 3 Design a balanced singly reinforced concrete beam with a span of 5m to carry a dead load of 25-kN/m and working live load of 20 kN/m. Use M20 mix and steel is of Fe 415 grade steel. [14M]
- 4 An L beam has flange of the beam is 90 cm x 12cm and web below is 23cm x 50cm. Determine the area of compression and tension steels needed for the cross section if it is to carry a factored bending moment of 400 kNm. Assume M20 concrete and TMT 500 grade steel. [14M]
- 5 Design a short circular column 6m long to carry an axial load of 250kN if both ends of the column are fully restrained using i) Lateral ties and ii) helical steel [14M]
- 6 An RC beam has an effective depth of 300mm and breadth of 150mm. It contains 4-20mm bars. Determine the shear resistance of the concrete beam if $\sigma_{sv} = 415 \text{ N/mm}^2$ for i) $\sigma_{ck} = 20 \text{ N/mm}^2$ and ii) $\sigma_{ck} = 30 \text{ N/mm}^2$ [14M]
- 7 The section of a cantilever beam designed for a span of 5.0m is having dimensions 300 x 600mm with 3 numbers 28mm diameter bars in compression and 3 numbers 20mm diameter bars in tension. The beam has been designed for a bending moment of 200kNm (at support) under service loads, of which 70 percent is due to permanent (dead) loads. The loading is uniformly distributed on the span. Assume M20 concrete and Fe 415 steel. Calculate the maximum short-term deflection. [14M]



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Examination hall.

PART -A

- 1 Design an isolated square footing for a column 450mm x 450mm reinforced with 8-25 mm diameter bars carrying a service load of 2000 kN The bearing capacity of soil is 250 kN/m² at a depth of 1.5m below ground. The footing is restricted to 2.0 m in one direction Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column. [28M]
 Draw to scale:
 a) Longitudinal section showing the reinforcement details.
 b) The plan showing reinforcement details.

(OR)

- 2 Design a simply supported roof slab for a room 4.5 m x 6 m measuring from inside. [28M]
 Thickness of the wall is 400 mm. The superimposed load exclusive of the self weight is 2.5 kN/m². The slab may be assumed to be simply supported on all four edges with corners held down. Use M20 mix and Fe 415 grade steel.
 a) Draw the reinforcement of the slab in plan view
 b) Draw cross section of the slab including beams with reinforcement details

PART -B

- 3 Design a balanced singly reinforced concrete beam with a span of 6m to carry a [14M]
 dead load of 30-kN/m and working live load of 25 kN/m. Use M15 mix and steel is of Fe 415 grade steel.
- 4 An RC beam has an effective depth of 450mm and breadth of 300mm. It contains 5- [14M]
 20mm bars mild steel out of which two bars curtailed at a section where shear force at service load is 100kN. Design the shear reinforcement if the concrete is M20.
- 5 Design a section of a ring beam 50cm wide and 65cm deep subjected to a bending [14M]
 moment of 120kNm, twisting moment of 7.5-kNm and shear force of 150 kN at ultimate. Use M20 mix and Fe 415 grade steel.
- 6 Draw axial force moment interaction curve for a rectangular column with 2% steel [14M]
 distributed equally on two faces. Assume a minimum of 12 bars placed at an effective cover of 0.15D.
- 7 Explain short-term deflection. Explain the difficulty in estimating short term deflection as [14M]
 per IS code procedure when applied moment at service loads is marginally less than the cracking moment Are the nominal detailing requirements of the code adequate for ensuring crack width control? Comment.



III B. Tech I Semester Regular Examinations, October/November - 2018

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

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

PART -A

1. a) What is the need of double circuit transmission line? [3M]
- b) What is the effect of line capacitance for lagging load? [2M]
- c) Why rigorous solution method is required for long lines. [2M]
- d) What is meant by Wave front? [2M]
- e) What is meant by Ferranti effect? [3M]
- f) What are the main components of overhead lines? [2M]

PART -B

2. a) What are ACSR conductors? Explain the advantages of ACSR conductors when used for overhead lines. [7M]
- b) Calculate the capacitance per phase of a three phase, three wire system by considering earth effect, when the conductors are arranged in a horizontal plane with spacing $D_{12}=D_{23}=3.5\text{m}$, and $D_{31}=7\text{m}$. The conductors are transposed and each has a diameter of 2.0 cm. Assume the transmission line is 4m above the ground level. [7M]
3. a) What are various parameters of a transmission line and how they are considered for different lines? [7M]
- b) A three-phase line delivers 3600 kW at a power factor 0.8 lagging to a load. If the sending end voltage is 33 kV, determine i) receiving end voltage ii) line current iii) transmission efficiency. The resistance and reactance of each conductor is 5.31Ω and 5.54Ω respectively. [7M]
4. a) Starting from first principles deduce expressions for ABCD constants of a long line in terms of its parameters. [7M]
- b) A 3-phase transmission line has the following constants. Resistance/ ph/ km = 0.16 ohm; reactance/ ph/km = 0.25 ohm. Shunt admittance/ph/km = 1.5×10^{-6} mho. Calculate by rigorous method the sending end voltage and current when the line is delivering a load P-20MW at 0.8 p.f lagging. The receiving end voltage is kept constant at 110 kV. [7M]
5. a) Develop equivalent circuit for analyzing the behavior of traveling waves at transition point's transmission lines. [7M]
- b) Two stations are connected together by an underground cable having a surge impedance of 60 ohms joined to an overhead line with a surge impedance of 400 ohms. If a surge having a maximum value of 100 kV travels along the cable towards the junction with the overhead line, determine the value of the reflected and transmitted wave of voltage and current at the junction. [7M]



6. a) Explain the effect of radio interference on the performance of transmission lines. [7M]
- b) Find the disruptive critical voltage and visual corona voltage (local corona as well as general corona) for a 3 phase 220 kV line consisting of 22.26 mm diameter conductors spaced in a 6 meters delta configuration. The following data can be considered. Temperature 25°C , Pressure 73 cm of mercury, surface factor 0.84, irregularity factor for local corona 0.72, irregularity factor for general corona 0.82 m. [7M]
7. a) Explain why suspension insulators are preferred for high voltage transmission lines. What is a strain insulator and where it is used? [7M]
- b) An overhead line has the following data: span length 160 meters, conductor diameter 0.95 cm, weight per unit length of the conductor 0.65 kg/meter. Ultimate stress $4,250\text{ kg/cm}^2$, wind pressure 40 kg/cm^2 of projected area. Factor of safety 5. Calculate sag? [7M]



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 2. Answer **ALL** the question in **Part-A**
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PART -A

1. a) What are the advantages of bundled conductor? [2M]
- b) What are the limitations of nominal T and π methods? [2M]
- c) What are the methods used for computing the hyperbolic functions in the solution of long lines. [2M]
- d) What are the causes of traveling wave in the transmission lines? [2M]
- e) Define the skin and proximity effects. [3M]
- f) What are the disadvantages of loose span? [3M]

PART -B

2. a) Clearly explain what do you understand by GMR and GMD of a transmission line? [7M]
- b) Calculate the capacitance per phase of a three phase, three wire system, when the conductors are arranged in a horizontal plane with spacing $D_{12}=D_{23}=3.5\text{m}$, and $D_{13}=7\text{m}$. The conductors are transposed and each has a diameter of 2.0 cm. [7M]
3. a) Explain the effect of power factor on regulation and efficiency. [6M]
- b) A 3- phase has a series impedance of $300\angle 75^\circ$ ohms per phase and shunt admittance of $25 \times 10^{-4} \angle 90^\circ$ siemens per phase. The voltage at the receiving end is 220kV but there is no load at receiving end. A load of 100 MW at UPF is connected at the midpoint of the line. Using nominal- π method, find sending end voltage. [8M]
4. a) Explain the surge impedance loading with necessary expressions. [7M]
- b) A 3- phase transmission line is 480km long and serves a load of 400MVA, 0.8p.f lag at 345kV. The ABCD constants of the line are $A=D=0.818\angle 1.3^\circ$; $B=172.2\angle 84.2^\circ$; $C=0.001933\angle 90.4^\circ$ mhos. Determine the sending end line to neutral voltage, the sending end current and the percent voltage drop at full load. [7M]
5. a) Discuss the phenomenon of wave reflection and refraction. Derive expression for reflection and refraction coefficients. [7M]
- b) A 200 kV, 3 μs , rectangular surge travels on a line of surge impedance of 400 ohms. The line is terminated in a capacitance of 3000 pF. Find an expression for voltage across the capacitance. [7M]



6. a) Explain the effect of shunt compensation on the performance of transmission lines. [7M]
- b) A 132 kV line with 2 cm diameter is built so that corona takes place if the line voltage is 220 kV (r.m.s). If the value of potential gradient at which ionization occurs can be taken as 30 kV per cm (peak). Find the spacing between the conductors. [7M]
7. a) Define string efficiency. Why is it necessary to have high string efficiency? How can it be achieved? [7M]
- b) A transmission line conductor having a diameter of 19.5 mm weighs 0.85 kg/m. The span is 275 meters. The wind pressure is 40 kg/m^2 of projected area with ice coating 13 mm. The ultimate strength of the conductor is 8000 kg. Calculate the maximum sag, if the factor of safety is 2 and ice weighs 910 kg/m^3 ? [7M]



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POWER SYSTEMS-II

(Electrical and Electronics Engineering)

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 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
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PART -A

1. a) What are the properties of conducting material? [2M]
- b) How do you classify the transmission line in to short, medium and long lines. [3M]
- c) Define the surge impedance loading. [2M]
- d) What is a traveling wave? [2M]
- e) What is the effect on resistance of solid conductors? [3M]
- f) What are the needs of grading of insulators? [2M]

PART -B

2. a) What do you understand by transposition of lines? What is its effect on the performance of the line? [7M]
- b) Calculate the capacitance per phase of a three phase three wire transposed system when the conductors are arranged at the corners of a triangle having sides of 1.0 m, 1.5 m and 2.0 m. Diameter of each conductor is 1.2 cm. [7M]
3. a) Draw the vector diagrams of nominal- π and nominal T models of medium transmission line. Derive the expression for voltage regulation of both the models. [7M]
- b) An overhead single phase delivers 1.1MW at 33 kV at 0.9 power factor lagging .The total resistance of the line is 10Ω and the total inductive reactance is 15Ω . Determine (i) %voltage regulation (ii) sending end power factor (iii) transmission efficiency. [7M]
4. a) Explain the interpretation of the long line equations. [7M]
- b) $A=D=0.936+j 0.016$; $B=33.5+j138$ ohms; $C=(-5.18+j914) 10^{-6}$ mhos. The load at the receiving end is 50 MW at 220 kV with a power factor of 0.9 lagging. Find the sending end voltage and regulation of line. [7M]
5. a) Define surge impedance of a line. Obtain the expressions for voltage and current waves at a junction or at transition point. [7M]
- b) A 200 kV surge travels on a transmission line 400 ohms surge impedance and reaches a junction where two branch lines of surge impedances of 500 ohms and 300 ohms are connected with the transmission line. Find the surge voltage and current transmitted into each branch line. Also find the reflected voltage and current. [7M]



6. a) What is Ferranti effect? Deduce a simple expression for the voltage rise of an unloaded line. [7M]
- b) A 3-phase 220 kV, 50 Hz, transmission line consists of 3 cm diameter conductors spaced 2 meters apart in equilateral triangle formation. If the temperature is 20°C and atmospheric pressure 75 cm determine the corona loss per km of the line. Take irregularity factor as 0.8. [7M]
7. a) Explain how sag is determined for an overhead line conductor taking into account the effects of wind and ice loading. [7M]
- b) Each of the three insulators forming a string has a self-capacitance of 'C' Farads. The shunting capacitance of the connecting metal work of each insulator is 0.3 C to earth and 0.2 C to the line. A guard ring increases the capacitance to the line of the metal work of the lowest insulator to 0.5 C. Calculate the string efficiency of this arrangement with the guard ring. [7M]



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PART -A

1. a) What is meant by loop inductance? [2M]
- b) Define distributed parameters in the transmission lines? [2M]
- c) Define the characteristic impedance and propagation constant of a transmission line. [2M]
- d) What are the expressions for the voltage and current when a line is terminated by an inductance and a capacitance? [3M]
- e) What are the disadvantages of corona? [3M]
- f) What is the need of arcing horns of insulators? [2M]

PART -B

2. a) Prove that the inductance of a group of parallel wires carrying current can be represented in terms of their geometric distance. [7M]
- b) Calculate the inductance of a conductor per phase of a three phase, three-wire system. When the conductors are arranged at the corners of an equilateral triangle of 3.5 m sides and the diameter of each conductor is 2 cm. [7M]
3. a) What do you understand by the terms nominal T and nominal- π circuits? Derive the expressions for the ABCD constants for the nominal- π circuit of a medium transmission line. [7M]
- b) An overhead 3- phase transmission line delivers 5000 kW at 22kV at 0.8 power factor lagging the resistance and reactance of each conductor is 4 ohms and 6 ohms respectively. Determine i) sending end voltage ii) percentage regulation and iii) Transmission efficiency. [7M]
4. a) Explain the equivalent π method of solution for the performance of long transmission lines? Draw a phasor diagram with the receiving end voltage as reference. [7M]
- b) Find the network constants of a long transmission line 3 phase, 50 Hz and 150 km long whose resistance per km is 0.2Ω and inductance per km is 1.5 mH and capacitance per km is $0.008 \mu\text{F}$. Neglect the conductance of the line. [7M]
5. a) Starting from first principles show that surges behave as traveling waves find expressions for surge impedance and wave velocity. [7M]
- b) A 500 kV surge travels on an overhead line of surge impedance 400Ω towards its junction with a cable which has a surge impedance of 40Ω . Find i) transmitted voltage and current, ii) reflected voltage and current. [7M]



6. a) Discuss why receiving end voltage of an unloaded long line may be more than the sending end voltage. [7M]
- b) Find the disruptive critical voltage and visual corona voltage for a grid of line operating at 132 kV. The line consisting of 1.96 cm diameter conductors spaced 3.81 meters apart. The following data can be considered. Temperature 44° c, barometric Pressure 73.7 cm of mercury, conductor surface factor 0.84, fine weather 0.8, rough weather 0.66. [7M]
7. a) Derive the expression for sag and tension when the supports are at unequal heights. [7M]
- b) A string of eight suspension discs is fitted with a grading ring. Each pin to earth capacitance is C. If the voltage distribution is uniform find the values of line to pin capacitances. [7M]



III B. Tech I Semester Regular Examinations, October/November - 2018

DESIGN OF MACHINE MEMBERS- II

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
Note: Data Book Allowed

PART -A

1. a) What is meant by bearing modulus? [2M]
- b) List various stresses induced in the connecting rod. [2M]
- c) Write an expression for resultant stresses in a curved beam subjected to direct stress and bending stress. [2M]
- d) Name the cross-sections of flat belt, V-belt, and rope. [2M]
- e) Differentiate between gear and belt drives. [3M]
- f) State the application of hand and foot levers. [3M]

PART -B

2. a) A bearing, 50 mm in diameter and 75 mm in length supports a overhanging shaft, running at 900 r.p.m. the room temperature is 30°C, and the bearing temperature is 75°C. The viscosity of the oil used is 0.012 kg/m-s at the operating temperature of 120°C. The diametral clearance is 0.05 mm, and the bearing is to operate in still air, without any artificial cooling. Determine [8M]
 - i) the permissible load on the bearing, and ii) power loss
- b) Explain design of ball bearings. [6M]
3. Design a cast iron piston for a four stroke I.C engine, for the following [14M] specifications:
 - Cylinder bore = 120 mm
 - Stroke length = 150 mm
 - Maximum gas pressure = 5 MPa
 - Brake mean effective pressure = 0.7 MPa
 - Fuel consumption = 0.25 kg/kW/hr
 - Speed = 2400 r.p.m
 - Assume any other data necessary for the design.
4. For a square 50 x 50 mm cross-section, find the maximum tensile and compressive [14M] stress if $P = 9.5$ kN and plot the total stress across the cross section

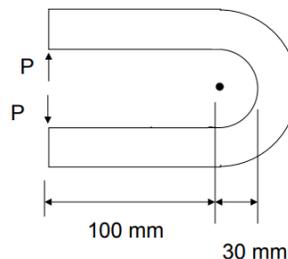


Fig.1



5. a) Design a chain drive to actuate a compressor from 15 kW electric motor running at 1000 RPM, the compressor speed being 350 RPM, the minimum centre distance is 500 mm; the compressor operates 16 hours per day. The chain tension may be adjusted by shifting the motor on slides. [10M]
- b) How does the helix angle influence on the efficiency of square threaded screw? [4M]
6. A helical cast steel gear with 30° helix angle, has to transmit 25 kW at 2000 r.p.m. if the gear has 24 teeth, determine the necessary module and face width of the gear. The tooth profile is 20° full depth involute, and static strength of the gear material is 56 MPa. Take the face width of the gear as 3 times the normal pitch, and velocity factor, $C_v = 15/15+v$, where v is pitch line velocity in m/s. [14M]
7. A foot lever is 500 mm from the centre of the shaft to the point of application of the load; whose magnitude is 700 N. Determine [14M]
- the diameter of shaft where the lever is fitted,
 - the dimensions of the key, and
 - The size of the cross-section of the arm of the foot lever at the boss.
- Assume that the depth of the arm as three times the width. Take $\sigma_t = 60$ MPa, $\sigma_c = 100$ MPa, and $\tau = 50$ MPa for the shaft key, and lever.



III B. Tech I Semester Regular Examinations, October/November - 2018

DESIGN OF MACHINE MEMBERS- II

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B****Note: Data Book Allowed**PART -A

1. a) What are rolling contact bearings? [2M]
- b) State the function of pistons used in IC engine. [2M]
- c) What are the assumptions made in the derivation of stresses in a curved beam subjected to bending moments? [2M]
- d) How will you designate a chain drive? [3M]
- e) What is the significance of determining the beam strength of a gear tooth? [3M]
- f) State some of the applications of levers in engineering practice. [2M]

PART -B

2. a) A 6203 single row deep groove ball bearing has a basic static load rating of 4500 N, and basic dynamic load rating of 7500 N. A radial load of 1600 N, and an axial load of 1400 N are acting on the bearing. Calculate the rated life of the bearing. [7M]
- b) What procedure would you follow while designing a journal bearing? Explain. [7M]
3. Design a centre crankshaft for a single cylinder vertical engine using the following [14M]
data:
Cylinder bore = 125mm, (L/r) ratio = 4.5, Maximum gas pressure = 2.5MPa, length of the stroke =150 mm, weight of flywheel cum belt pulley = 1KN, Total belt pull = 2 KN, Width of the hub for flywheel cum belt pulley = 200 mm. The torque on the crankshaft is maximum when the crank turns through 25° from the top dead centre and at this position the gas pressure inside the cylinder is 2MPa. The belts are in the horizontal direction. Assume suitable data and state the assumptions you make.
4. An open ring having channel section as shown in fig.1 is subjected to compressive [14M]
load of 75 kN. Determine the stresses at A and B.

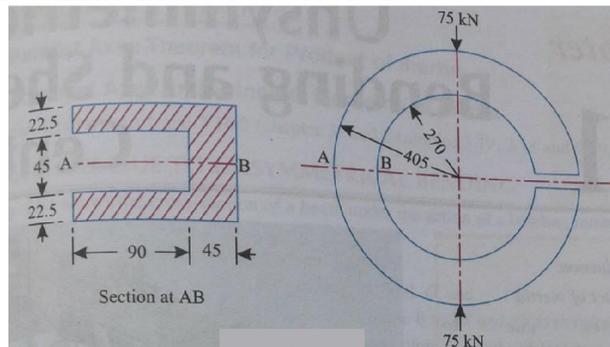


Fig. 1

Note: All Dimensions are in mm.



5. a) In a crossed belt drive the diameters of the driver and follower pulleys are 200 mm and 400 mm respectively. The centre distance of the drive is 2 m. The driver pulley rotates at 400 r.p.m. Find the angle of contact between belt and both the pulleys, and the length of the belt required. What is the power capacity of the drive, if the permissible tension in the belt is 1.2 kN, and the coefficient of friction between the belt and both the pulleys is 0.25. [8M]
- b) Differentiate between differential and compound screws. [6M]
6. Design a pair of spur gears with stub teeth, and to transmit 50 KW. From 180 mm pinion, running at 2400 r.p.m to a gear running at 1400 r.p.m. Both the gears are made of steel having BHN of 260. Determine the pitch of the gears by means of Lewis equation, and then modify the dimensions if required, to keep within the limits set by the dynamic and wear load requirements. [14M]
7. A lever loaded safety valve is 70 mm in diameter. It is required to blow-off at a pressure of 1.5 N/mm^2 . The length of the lever is 1000 mm. The distance between the fulcrum and toggle is 100 mm. determine the amount of dead weight to be put at the end of the lever. Also, determine the size of the cross-section of the lever, which is rectangular in form, and the size of the pins at the fulcrum and the toggle. Use the following stress values: [14M]
Tensile stress, $\sigma_t = 60 \text{ MPa}$,
Shear stress $t = 50 \text{ MPa}$
Bearing pressure, $p = 12 \text{ MPa}$
Assume forked end connections for the pins at the fulcrum and toggle.



III B. Tech I Semester Regular Examinations, October/November - 2018
DESIGN OF MACHINE MEMBERS- II
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
Note: Data Book Allowed

PART -A

1. a) Define the term static equivalent load as applied in rolling contact bearing. [2M]
- b) What is the function of piston skirt of an IC engine? [2M]
- c) Write down expression for winkler-bach formula. [2M]
- d) Name the types of stresses induced in wire ropes. [3M]
- e) What is meant by wear load of a gear tooth? [3M]
- f) Classify and describe the various types of levers. [2M]

PART -B

2. a) A bearing for a centrifugal pump is 75 mm in diameter, and 125 mm in length. The journal is machined so as to give a radial clearance of 0.0015 mm per mm radius. The journal rotates at 1440 r.p.m, and resists a load of 10 KN. Oil is supplied with a viscosity of 0.03 kg/m-s at the operating temperature. Determine the coefficient of friction, the value of the bearing characteristic number, and the heat generated. [8M]
- b) What are the advantages and disadvantages of rolling contact bearings? [6M]
3. Design the connecting rod for a petrol engine, from the following data: [7M]
Diameter of the piston = 110 mm
Mass of the reciprocating parts = 2 kg
Length of the connecting rod = 325 mm
Stroke length = 150 mm
Speed = 1500 r.p.m, with permissible over speed of 2500 r.p.m
Compression ratio = 4
Maximum explosion pressure = 2.5 N/mm².
4. Figure.1 shows an open ring having T section. Determine the stresses at the points A and B if the ring is subjected to a load of 150 kN. [7M]

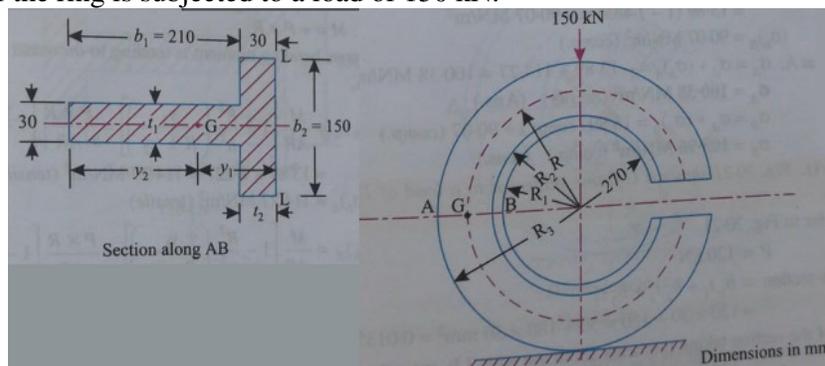


Fig.1

Note: All Dimensions are in mm.



5. a) The lead screw of a lathe has ACME threads of 40 mm nominal diameter and 6 mm pitch. The screw must exert an axial thrust of 20 kN for driving the carriage. The thrust is carried on a collar with 45 mm inner diameter and 90 mm outer diameter. The lead screw rotates at 36 r.p.m. determine [8M]
i) the power required to operate the screw, and
ii) the efficiency of the lead screw.
Take coefficient of friction for the screw thread as 0.15, and for the collar surface as 0.12
- b) Write the design procedure for a rope drive. [6M]
6. a pair of parallel helical gears consists of 24 teeth pinion rotating at 5000 rpm and supplying 2.5 kW power to a gear. The speed reduction is 4:1. The normal pressure angle and helix angle are 20° and 23° respectively. Both gears are made of hardened steel ($S_{ut}=750 \text{ N/mm}^2$). The service factor and the factor of safety are 1.5 and 2 respectively. The gears are finished to meet the accuracy of grade 4. In initial stages of gear design, assume that the velocity factor accounts for the dynamic load and that the face width is ten times the normal module. Assuming the pitch line velocity to be 10 m/s, estimate the normal module. Select the first preference module and calculate the main dimensions. [14M]
7. Design a wire rope for a vertical mine hoist to lift a load of 50 kN, from a depth of 250m. Rope speed of 8 m/s is to be attained in 10 seconds. Take factor of safety as 6. [14M]



III B. Tech I Semester Regular Examinations, October/November - 2018
DESIGN OF MACHINE MEMBERS- II
 (Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

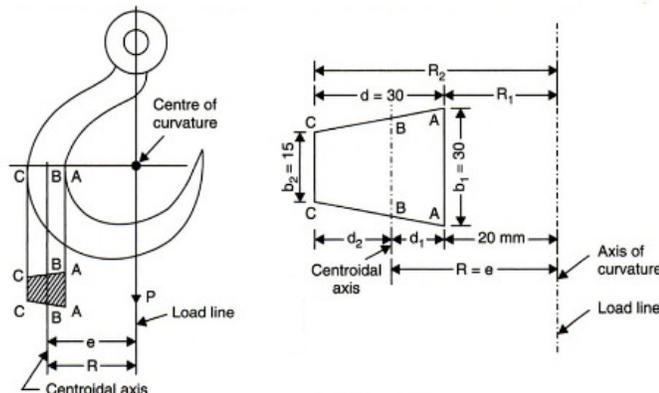
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
Note: Data Book Allowed

PART -A

1. a) What is meant by hydrodynamic lubrication? [2M]
- b) What is meant by whipping of a connecting rod and what is its effect. [3M]
- c) Compare straight beam and curved beam. [2M]
- d) What are the applications of flat belt drives? [2M]
- e) Operation of helical gearing, compared to spur gearing is relatively silent, justify the statement. [3M]
- f) What is a lever? What is the principle on which it works? [2M]

PART -B

2. a) Specify a suitable deep groove ball bearing for a radial load of 2.5 kN, and a thrust load of 0.9 kN. The operating speed is 3000 r.p.m. Assume steady load, and life of 15000 hours at 95% reliability. Recommend the bearing with the maximum possible bore size. [8M]
- b) Sketch the pressure distribution in a journal bearing with thick film lubrication in axial, and radial directions. [6M]
3. In an overhung crank, the axial distance between the axis of the crankshaft journal and the crank pin is 350 mm, and the length of the crank is 450 mm. if the maximum tangential force acting on the crank pin is 100 kN; design the crank pin. Take the safe bearing pressure as 6 MPa, and bending stress as 60 MPa. Determine the diameter of the crankshaft, if the principal stress is limited to 60 MPa. [14M]
4. A hook carries a load of 7.5 kN and the load line is at a distance of 20 mm from the inner edge of the section which is trapezoidal. The load line also passes through the center of curvature of the hook. The dimensions of the central horizontal trapezoidal section are: inner width 30mm; outer width =15 mm; depth=30 mm. calculate the maximum and minimum stresses. Also plot the variation of stress across the section. [14M]



5. a) A cast iron flat pulley transmits 20 kW at a speed of 560 r.p.m. The pulley overhangs the nearest bearing by 200 mm. Assuming the ratio of belt tensions as 2; determine [8M]
i) shaft diameter
ii) pulley diameter, and
iii) cross-section of eight arms.
- b) List out the steps to be followed while designing a wire rope. [6M]
6. It is required to design a pair of spur gears with 200 full depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to 22.5 KW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material for pinion is plain carbon steel Fe 420 ($S_{ut} = 410 \text{ N/mm}^2$), while the gear is made of grey cast iron FG 200 ($S_{ut} = 200 \text{ N/mm}^2$). The factor safety is 1.5. Design the gears based on the lewis equation and using velocity factor to account for the dynamic load. [14M]
7. Design a right angled bell crank lever having one arm 500 mm and the other 150 mm long. The load of 5 kN is to be raised acting on a pin at the end of 500 mm arm and the effort is applied at the end of 150 mm arm. The lever consists of a steel forging, turning on a point at the fulcrum. The permissible stresses for the pin and lever are 84 MPa in tension and compression and 70 MPa in shear. The bearing pressure on the pin is not to exceed 10 N/mm^2 . [14M]



III B. Tech I Semester Regular Examinations, October/November - 2018

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

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

PART -A

1. a) What is uniform quantization? [2M]
- b) Draw the block diagram of BPSK demodulator. [2M]
- c) Give the expression for the BER of polar signaling. [2M]
- d) Define source entropy. [3M]
- e) What is the relation between channel capacity, channel bandwidth and S/N? [3M]
- f) Define the code rate of convolutional encoder. [2M]

PART -B

2. a) Derive an expression for mean-square value of quantization error. [7M]
- b) What is aliasing? What causes it? How can it be reduced? [7M]
3. a) Explain the process of generating FSK signals. [7M]
- b) Describe the process of detecting DPSK signals. [7M]
4. Derive an expression for BER of BPSK scheme. [14M]
5. a) A memory less source emits messages m_1 and m_2 with probabilities 0.8 and 0.2, respectively. Find the Huffman binary code for this source. Determine the code efficiency. [7M]
- b) A message source generates one of four messages randomly every microsecond. The probabilities of these messages are 0.4, 0.3, 0.2, and 0.1. Each emitted message is independent of the other messages in the sequence. Find the source entropy. [7M]
6. a) Given a generator matrix $G = [1 \ 1 \ 1]$. Construct a (3, 1) code. How many errors can this code correct? [7M]
- b) Determine the Hamming bound for a ternary code (whose three code symbols are 0, 1, 2). [7M]
7. a) What is a binary symmetric channel? Write down its transition matrix in terms of p , the transition probability. [7M]
- b) Write notes on syndrome decoding. [7M]



III B. Tech I Semester Regular Examinations, October/November - 2018

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

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

PART -A

1. a) What is the difference between uniform and non-uniform quantization? [2M]
- b) Draw the ASK waveform for the data 1 1 0 1 0 1 1 0 1 using unipolar signaling. [2M]
- c) Give the expression for BER of coherent BPSK scheme. [2M]
- d) Define information rate. [3M]
- e) Define channel capacity. [3M]
- f) What are the different representations of convolutional encoder? [2M]

PART -B

2. a) Draw the PCM system block diagram and explain its operation. [7M]
- 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 Δ required to avoid slope overload
 - ii) the $(S/N)_q$ for the system for the given sinusoidal signal. [7M]
3. a) Explain the process of detection of BPSK signals. [7M]
- b) Is it possible to detect BFSK signals non-coherently? If yes, explain. [7M]
4. Explain why the matched filter is called as an optimum filter. Why the name matched filter? [14M]
5. A memory less source emits six messages with probabilities 0.3, 0.25, 0.15, 0.12, 0.1 and 0.08. Find the Huffman code. Determine its average word length, the efficiency and the redundancy. [14M]
6. a) If G and H are the generator and parity check matrices, respectively, then show that $GH^T = 0$. [7M]
- b) A generator matrix $G = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$ generates a (4,2) code. What is the parity check matrix of this code? [7M]
7. What are the different methods of decoding of convolutional codes? Explain. [14M]



III B. Tech I Semester Regular Examinations, October/November - 2018

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

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

PART -A

- | | | |
|-------|--|------|
| 1. a) | What is the difference between PCM and DPCM? | [2M] |
| b) | Draw the block diagram of BFSK detector. | [2M] |
| c) | Give the expression for optimum demodulation of DPSK signals. | [2M] |
| d) | Define mutual information. | [3M] |
| e) | Give the transition matrix of binary symmetric channel. | [3M] |
| f) | Draw the state diagram of a convolutional encoder with $k = 1$, $n = 2$ and $r = 1/2$. | [2M] |

PART -B

- | | | |
|-------|--|-------|
| 2. a) | Explain the operation of delta modulator and demodulator. | [7M] |
| b) | With the help of block schematic diagrams of the transmitter and the receiver, explain the working of binary PCM system. | [7M] |
| 3. a) | For a fixed bit-error probability, comment on the bandwidth efficiencies and the average transmitted power requirements of BPSK and QPSK schemes. | [7M] |
| b) | Draw the power spectrum of BPSK and BFSK signals. | [7M] |
| 4. a) | Explain the properties of the matched filter. | [7M] |
| b) | What is the need for synchronization in digital communication system? | [7M] |
| 5. a) | Define the following terms: | [7M] |
| | i) optimal code | |
| | ii) instantaneous code | |
| | iii) average length of a code | |
| b) | A message source generates one of four messages randomly every microsecond. The probabilities of these messages are 0.4, 0.3, 0.2, and 0.1. Each emitted message is independent of the other messages in the sequence. Find the rate of information generated by this source (in bits per second). | [7M] |
| 6. a) | Find a generator polynomial $g(x)$ for a (7, 4) cyclic code. Determine the code vectors for the data vector: 1010 | [7M] |
| b) | Write notes on syndrome decoding. | [7M] |
| 7. | Explain the trellis diagram decoding using Viterbi decoding algorithm. | [14M] |



III B. Tech I Semester Regular Examinations, October/November - 2018

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
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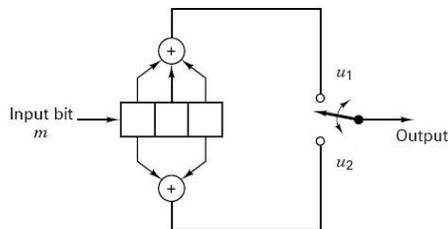
PART -A

1. a) What is the need for adaptive delta modulation? [2M]
- b) Draw the DPSK signal generator block diagram. [2M]
- c) Give the expression for BER of QPSK receiver. [2M]
- d) A source generates two symbols with probability 0.5 and 0.5. Find the source entropy. [3M]
- e) What is binary symmetric channel? [3M]
- f) What is the difference between hard-decision decoding and soft-decision decoding? [2M]

PART -B

2. a) Compare PCM and DM systems. [7M]
- b) What are the different types of noise in DM system? Explain. [7M]
3. a) Explain the method of detecting BPSK signals. [7M]
- b) What are the similarities between BPSK and BFSK signals? [7M]
4. Derive a general expression for probability of error. [14M]
5. a) Define mutual information and list its properties. [7M]
- b) Define the following: [7M]
 - i) Shannon's Source Coding Theorem
 - ii) Channel Capacity
6. a) Find a generator polynomial $g(x)$ for a (7,4) cyclic code, and find code vectors for the data: **0001** [7M]
- b) Construct a systematic (7,4) cyclic code using the generator polynomial [7M]

$$g(x) = x^3 + x^2 + 1$$
7. A convolutional encoder is shown in Figure.1. Draw the state diagram of it. [14M]

**Figure.1**



III B. Tech I Semester Regular Examinations, October/November - 2018
OBJECT ORIENTED ANALYSIS & DESIGN USING UML

(Computer Science Engineering)

Time: 3 hours

Max. Marks: 70

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

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**PART -A**

- |       |                                                          |      |
|-------|----------------------------------------------------------|------|
| 1. a) | Write the significance of model building.                | [2M] |
| b)    | Define Conceptual Clustering.                            | [2M] |
| c)    | Write the importance of notational things in UML.        | [2M] |
| d)    | Write the purpose of Fork node in UML.                   | [3M] |
| e)    | Write the different parts of a state in a state diagram. | [2M] |
| f)    | How do you model an API?                                 | [3M] |

**PART -B**

- |       |                                                                                                                |      |
|-------|----------------------------------------------------------------------------------------------------------------|------|
| 2. a) | Elaborate the importance of canonical form of a complex system.                                                | [7M] |
| b)    | How does one properly identify the classes and objects that are relevant to a particular application? Explain. | [7M] |
| 3. a) | Discuss how the quality of an abstraction can be measured.                                                     | [7M] |
| b)    | Explain the procedure to identify key abstractions.                                                            | [7M] |
| 4. a) | Write the four kinds of relationships available in the UML.                                                    | [7M] |
| b)    | Draw the class diagram for stock maintenance system.                                                           | [7M] |
| 5. a) | Write the features that distinguish sequence diagrams from collaboration diagrams.                             | [7M] |
| b)    | Draw the use case diagram for online railway reservation system.                                               | [7M] |
| 6. a) | Write the procedure to handle events in active and passive objects.                                            | [7M] |
| b)    | Draw the state chart diagram for university management system.                                                 | [7M] |
| 7. a) | Discuss about the structural aspects of collaboration.                                                         | [7M] |
| b)    | Draw the component diagram for Aadhar management system.                                                       | [7M] |

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**III B. Tech I Semester Regular Examinations, October/November - 2018**  
**OBJECT ORIENTED ANALYSIS & DESIGN USING UML**

(Computer Science Engineering)

Time: 3 hours

Max. Marks: 70

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

**PART -A**

- |    |    |                                                                |      |
|----|----|----------------------------------------------------------------|------|
| 1. | a) | Write any two fundamental limiting factors of human cognition. | [2M] |
|    | b) | Write the importance of polymorphism in OOAD.                  | [2M] |
|    | c) | Define association in UML.                                     | [2M] |
|    | d) | Write the significance of Join node in UML.                    | [3M] |
|    | e) | Define thread in behavioral modeling.                          | [3M] |
|    | f) | How do you model tables and files.                             | [2M] |

**PART -B**

- |    |    |                                                                                      |      |
|----|----|--------------------------------------------------------------------------------------|------|
| 2. | a) | What are the limitations of the human capacity for dealing with complexity? Explain. | [7M] |
|    | b) | Why software is inherently complex? Explain.                                         | [7M] |
| 3. | a) | Discuss about the three approaches to classification in detail.                      | [7M] |
|    | b) | Write the reason behind the difficulty of classification.                            | [7M] |
| 4. | a) | Write the procedure to model an object structure.                                    | [7M] |
|    | b) | Draw class diagram for an online railway reservation system.                         | [7M] |
| 5. | a) | Write the features that distinguish collaboration diagrams from sequence diagrams.   | [7M] |
|    | b) | Draw the use case diagram for library management system.                             | [7M] |
| 6. | a) | How do you model the lifetime of an object? Explain.                                 | [7M] |
|    | b) | Draw the state chart diagram for airline management system.                          | [7M] |
| 7. | a) | Discuss about the behavioral aspects of collaboration.                               | [7M] |
|    | b) | Draw the component diagram for bank management system.                               | [7M] |

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**III B. Tech I Semester Regular Examinations, October/November - 2018**  
**OBJECT ORIENTED ANALYSIS & DESIGN USING UML**

(Computer Science Engineering)

Time: 3 hours

Max. Marks: 70

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

**PART -A**

- |    |    |                                                         |      |
|----|----|---------------------------------------------------------|------|
| 1. | a) | Write the importance of typing and persistence in OOAD. | [2M] |
|    | b) | Write the two kinds of object relationships in OOAD.    | [2M] |
|    | c) | Define realization in UML.                              | [2M] |
|    | d) | Write the purpose of Swim lanes in UML.                 | [3M] |
|    | e) | Define process in behavioral modeling.                  | [3M] |
|    | f) | How do you model processors and devices.                | [2M] |

**PART -B**

- |    |    |                                                                                                                      |       |
|----|----|----------------------------------------------------------------------------------------------------------------------|-------|
| 2. |    | Explain the five attributes of a complex system in detail.                                                           | [14M] |
| 3. | a) | Aggregation is a specialized kind of association. Justify the validity of the statement.                             | [7M]  |
|    | b) | Discuss about identification of key mechanisms in classification.                                                    | [7M]  |
| 4. | a) | What are the four things that a well-structured class diagram should have? Explain.                                  | [7M]  |
|    | b) | Draw the class diagram for library management system.                                                                | [7M]  |
| 5. | a) | Forward engineering is possible for both sequence and collaboration diagrams. Justify the validity of the statement. | [7M]  |
|    | b) | Draw the activity diagram for online quiz management system.                                                         | [7M]  |
| 6. | a) | How do you model interprocess communication? Explain.                                                                | [7M]  |
|    | b) | Draw the state chart diagram for voter card management system.                                                       | [7M]  |
| 7. | a) | Write the five standard stereotypes that can be applied to components in UML.                                        | [7M]  |
|    | b) | Draw the deployment diagram for online shopping management system.                                                   | [7M]  |

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**III B. Tech I Semester Regular Examinations, October/November - 2018**  
**OBJECT ORIENTED ANALYSIS & DESIGN USING UML**

(Computer Science Engineering)

Time: 3 hours

Max. Marks: 70

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

**PART -A**

- |       |                                                                     |      |
|-------|---------------------------------------------------------------------|------|
| 1. a) | Write the importance of modularity and concurrency in OOAD.         | [2M] |
| b)    | Write the three common kinds of multiplicity across an association. | [3M] |
| c)    | Define generalization in UML.                                       | [2M] |
| d)    | Write the characteristics of a well-structured interaction diagram. | [2M] |
| e)    | Write the different parts of a state in a state diagram.            | [3M] |
| f)    | How do you model a source code?                                     | [2M] |

**PART -B**

- |       |                                                                                                          |       |
|-------|----------------------------------------------------------------------------------------------------------|-------|
| 2. a) | Discuss about the key hierarchies of complex systems in detail.                                          | [7M]  |
| b)    | What are the management implications of using object-oriented design? Explain.                           | [4 M] |
| c)    | Write the importance of model building.                                                                  | [3 M] |
| 3. a) | Classification is fundamentally a problem of clustering. Justify the validity of the statement.          | [7M]  |
| b)    | Explain the significance of classical categorization and conceptual clustering.                          | [7M]  |
| 4. a) | How do you model a logical database schema? Explain.                                                     | [7M]  |
| b)    | Draw the class diagram for course registration system.                                                   | [7M]  |
| 5. a) | How do you use interaction diagrams when you model dynamic aspects of a system? Explain with an example. | [7M]  |
| b)    | Draw collaboration and sequence diagram for simple telephone call.                                       | [7M]  |
| 6. a) | Write the procedure to build thread-safe abstractions.                                                   | [7M]  |
| b)    | Draw the state chart diagram for railway management system.                                              | [7M]  |
| 7. a) | Discuss about mapping between logical and physical models.                                               | [7M]  |
| b)    | Draw the deployment diagram for mobile network management system.                                        | [7M]  |

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**III B. Tech I Semester Supplementary Examinations, October/November - 2018**

**ENGINEERING GEOLOGY**

(Civil Engineering)

Time: 3 hours

Max. 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) | Define frost action? What is the role of freezing of water in weathering process? | [3M] |
|   | b) | What is specific gravity? How can it determined for minerals?                     | [4M] |
|   | c) | Discuss chevron and drag fold?                                                    | [3M] |
|   | d) | Describe isoseismal lines and their relation to epicenter.                        | [4M] |
|   | e) | Define deformability modulus and shear strength                                   | [4M] |
|   | f) | What are the factors affecting the water-tightness of a dam reservoir.            | [4M] |

**PART -B**

- |   |    |                                                                                                                                    |      |
|---|----|------------------------------------------------------------------------------------------------------------------------------------|------|
| 2 | a) | Define hydration? Discuss geological work of rivers.                                                                               | [6M] |
|   | b) | Write short note on i) river meandering ii) escarpments                                                                            | [4M] |
|   | c) | What is the importance of engineering geology related to civil engineers in working site?                                          | [6M] |
| 3 | a) | Write short note on i) Granulose ii) Maculose iii) Schistose                                                                       | [6M] |
|   | b) | What are igneous rocks? How they are formed?                                                                                       | [4M] |
|   | c) | Describe the physical properties of i) Quartz ii) Hornblende iii) Talc                                                             | [6M] |
| 4 | a) | What are unconformities? Discuss types of unconformities, What engineering problems are created by the presence of unconformities. | [8M] |
|   | b) | What is meant by folding of rock? How is it produced and classify types of fold?                                                   | [8M] |
| 5 | a) | Discuss and describe the causes of earthquake? What precautions are taken in building constructions in seismic zones?              | [8M] |
|   | b) | Discuss in details about resistivity survey method and applications of electrical resistivity method for ground water exploration. | [8M] |
| 6 | a) | Discuss the importance of geophysical methods, and give its significance                                                           | [8M] |
|   | b) | Write various electrical methods of geophysical prospecting? Explain using self potential method in geophysical prospecting.       | [8M] |
| 7 | a) | Write short note on i) purpose of tunnel ii) over break in tunnels.                                                                | [8M] |
|   | b) | What are the geological conditions necessary for the stability of a dam and life of a reservoir?                                   | [8M] |

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**III B. Tech I Semester Supplementary Examinations, October/November -2018**  
**ELECTRICAL MACHINES – III**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. 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 why single-phase induction motors do not have self – starting torque. [4M]  
 b) Explain the constructional aspect of the Synchronous generator. [4M]  
 c) Explain the effects of armature reaction and how can it be compensated. [4M]  
 d) Explain the term Voltage regulation and give its significance. [4M]  
 e) Explain why synchronous motor does not have starting torque. [3M]  
 f) Explain the effect of change of load on a synchronous motor. [3M]

**PART -B**

- 2 a) Explain the different methods of speed control of a single phase induction motor? [8M]  
 b) Draw and explain the torque – slip characteristic of a single – phase induction motor on the basis of Double – revolving field theory. [8M]
- 3 a) Explain the principle of operation of a synchronous generator. [8M]  
 b) A 4-pole, 50 Hz star connected alternator has 6 slots per pole per phase and a two layer winding with 4 conductors per slot. If the coil span is  $150^\circ$ , find the no –load terminal emf if the flux per pole is 300 mWb. [8M]
- 4 a) Explain the salient features of Salient pole rotor type synchronous machine in detail. [8M]  
 b) In a 1500 KVA, 3300 V, 50 Hz, three – phase , star – connected synchronous generator, a field current of 50 A produces a short- circuit current of 250 A and open – circuit voltage of 1100 V line to line. Determine the voltage regulation at full load and at 0.8 power factor lagging. Consider the armature resistance to be 0.3 ohms. [8M]
- 5 a) What is synchronizing Power? Derive equations for synchronizing power of cylindrical rotor and salient pole alternators. [8M]  
 b) A 5 KVA, 3 – phase, 220 V, three – phase star connected synchronous generator has  $X_d = 5$  ohms and  $X_q = 2$  ohms. If the generator delivers full load current at 0.8 power factor lagging and at rated voltage, determine the load angle and maximum power output of the generator. [8M]
- 6 a) Draw and explain the equivalent circuit and phasor diagram of a synchronous motor. [8M]  
 b) Explain the power angle characteristics of a salient pole synchronous motor. [8M]
- 7 Write short notes on the following: [16M]  
 i) V curves in synchronous motor and their significance  
 ii) synchronous induction motor

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**III B. Tech I Semester Supplementary Examinations, October/November - 2018**  
**INSTRUMENTATION & CONTROL SYSTEMS**  
(Mechanical Engineering)

Time: 3 hours

Max. 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) What do you mean by systematic errors? [4M]  
b) List the metals used for resistance thermometers and give their useful temperature ranges. [4M]  
c) Define vibration. List out its harmful effects? [4M]  
d) What are the requirements of materials for strain gauges? [4M]  
e) State the working principle of elastic transducer to measure of force? [3M]  
f) List some of the engineering situations where automatic control systems are used. [3M]

**PART -B**

- 2 a) Explain the working of different parts of Bourdon tube pressure gauge with generalized measuring system block diagram. [8M]  
b) Explain the working principle of Piezoelectric transducer with neat sketch and also list out its limitations. [8M]
- 3 a) Explain the working of the thermistor with neat sketch and also list out its advantages and limitations. [8M]  
b) Explain the working of Thermal conductivity gauge for the measurement of pressure with neat sketch. [8M]
- 4 a) Explain the working principle of operation of hot wire anemometer with neat sketch. [8M]  
b) Explain the construction and working of a vibrating reed tachometer for measuring speed. [8M]
- 5 a) With a neat sketch explain the use of resistance strain gauges for bending, compressive and tensile strain measurements. [8M]  
b) What do you mean by resistance strain gauges? Give a detailed discussion on the subject coverings the basic principle, gauge and binding materials and applications of the method. [8M]
- 6 a) Explain the working of Load Cells and give its usages [8M]  
b) How can you detect the moisture content of gases and explain any one method of it [8M]
- 7 a) List out the differences between the Positive and negative feedback systems and open loop and closed loop control systems. [8M]  
b) Describe a typical closed loop control system that can be used to control the temperature of water being heated by steam. [8M]

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**III B. Tech I Semester Supplementary Examinations, October/November - 2018****DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS**

(Common to Electronics Computer Engineering and Electronics Instrumentation Engineering)

Time: 3 hours

Max. 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 about data objects in VHDL.                  | [3M] |
|   | b) | Discuss about Technology Libraries.                  | [4M] |
|   | c) | Explain briefly Static RAM Internal structure.       | [4M] |
|   | d) | Explain about CMOS steady state electrical behavior. | [4M] |
|   | e) | Explain the significance of Dual Priority encoder.   | [4M] |
|   | f) | Compare latches and flip flops.                      | [3M] |

**PART -B**

- |   |    |                                                                                        |      |
|---|----|----------------------------------------------------------------------------------------|------|
| 2 | a) | Explain the Packages and Libraries of VHDL?                                            | [8M] |
|   | b) | Compare and contrast between VHDL and Verilog HDL.                                     | [8M] |
| 3 | a) | Explain why place and route tools are used in VHDL with the help of data flow diagram. | [8M] |
|   | b) | Explain in detail about Post Layout Timing Simulation.                                 | [8M] |
| 4 | a) | Explain the internal structure of PROM and list its advantages.                        | [8M] |
|   | b) | Describe DRAM with an appropriate diagram and explain about its timings.               | [8M] |
| 5 | a) | Explain dynamic electrical behavior of a CMOS.                                         | [8M] |
|   | b) | What are the salient features of ECL? and explain its internal structure               | [8M] |
| 6 | a) | Write the VHDL code for 16 bit barrel shifter.                                         | [8M] |
|   | b) | Design a 4 bit carry look ahead adder using gates and write the VHDL code for it.      | [8M] |
| 7 | a) | Write a VHDL program to design a modulo-8 counter.                                     | [8M] |
|   | b) | Explain in detail about the working of Johnson Counter using 74 LS194.                 | [8M] |

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