FACULTY OF ENGINEERING

B.E. 3/4 I-Semester (Civil) (Backlog) Examination, October 2020

BUILDING TECHNOLOGY AND SERVICES

Time: 2 Hours   **Max. Marks :75**

PART –A

Note : Answer any Seven Questions   **(7x3 = 21 Marks)**

1. Define horizontal circulation and vertical circulation in buildings?

2. State the wind effect on building

3. What is reverberation time?

4. What is absorption coefficient?

5. Differentiate between chemical content and organic content of water

6. Explain expansion and contraction in pipelines

7. State the principles of green buildings

8. What are the benefits of green buildings?

9. What do you understand by torus command in AutoCAD

10. Explain the function of Union in AutoCAD?

PART-B

Note : Answer any Three Questions   **(3 x 18 = 54 Marks)**

11. a) Explain the factors to be considered during selection of building site?
    b) Explain briefly various systems of mechanical ventilation?

12. a) What are the factors affecting the acoustics of buildings?
    b) What are the features of acoustically good auditorium?

13. a) Explain in details about the active and passive measure for fire protection in a building?
    b) Discuss how to maintain the quality of potable water in a building?

14. a) What are the characteristics of site selection for design of green building?
    b) Explain about the energy usage of heating, ventilating and air-conditioning systems in green buildings

15. a) Discuss to create a 3D elevation in AutoCAD? Illustrate your answer with an example.
    b) What is the use of extrude feature in AutoCAD? Give an example.

16. Explain in detail about the water efficient technologies adopted in green buildings?

17. Write short notes on the following :
    a) Design considerations for comfort.
    b) Sound absorbent materials.
    c) Importance of fire protection in buildings.
    d) Boolean commands in Auto CAD.

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FACULTY OF ENGINEERING

B.E. 3/4 (EEE/Inst.) I – Semester (Backlog) Examination, October

2020 Subject: Digital Electronics & Logic Design

Time: 2 Hours   **Max. Marks:75**

PART –A

Note : Answer any Seven Questions   **(7x3 = 21 Marks)**

1. Show that $(A + B)\overline{AB}$ is equivalent to $A \oplus B$. Also construct the corresponding logic diagrams.
2. What are the advantages of multiple output minimization?
3. Perform the following decimal subtraction in BCD by the 9's complement method. 679.6 - 885.9
4. How does the carry look ahead adder speeds up the addition process?
5. What are the drawbacks of RTL?
6. Define figure of merit.
7. What is debouncing switch? Explain.
8. Define ripple counter.
9. Differentiate PROM and PAL.
10. What is a sequence detector?

PART-B

Note : Answer any Three Questions   **(3 x 18 = 54 Marks)**

11. a) Write down the simplified Boolean expression in product of sums form for the following function and realize. $Y(a, b, c, d) = \pi M (0,1,3, 5, 6, 7, 9,10,11,12 ,13,15)$

    b) Simplify $(i)(A + B)(A + \overline{B})$

                       $(ii) \ A B C + \overline{A} B + A B \overline{C}$

12. a) Implement a 4-bit magnitude comparator.
    b) Explain about half subtractor.

13. a) Explain about the implementation of 3-to-8-line decoder.
    b) Discuss about open collector output.

14. a) Implement general BCD counter.
    b) Discuss about counter decoding.

15. a) Explain the steps involved in design of counters.
    b) Implement half adder circuit using PLA.

16. a) Simplify the following Boolean expression.
        $Y(A, B, C, D) = \Sigma m(1, 3, 7, 11, 15) + d(0, 2, 5)$
    b) Discuss about the operation of full adder.

17. a) What is multiplexer? Implement 4-multiplexer.
    b) Explain about basic latch circuit.

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FACULTY OF ENGINEERING
BE 3/4 (ECE) I Semester (Backlog) Examination, October 2020
Subject: Analog Communication

Time: 2 hours   **Max. Marks: 75**

PART –A

Note : Answer any Seven Questions   **(7x3 = 21 Marks)**

1. A 400Hz, 600Hz and 800Hz are three audio signals. AM modulates the carrier of 4MHz signal. What are the frequencies present in the output and sketch the spectrum.
2. What is Hilbert Transform and give the properties of Hilbert Transform?
3. Determine the modulation index, peak frequency deviation, power and bandwidth of a single tone FM signal represented by $S(t)=12Cos[22\pi10^8t + 6Sin4\pi10^3t]$.
4. Compare Phasor Diagrams of Conventional AM and NBFM.
5. What are the reasons for highest attention paid to design of front end of radio receiver?
6. Define selectivity and sensitivity of a radio receiver.
7. A receiver is connected to an antenna whose resistance is 50Ω has an equivalent noise resistance of 30Ω. Calculate the receiver's noise figure in decibels and its equivalent noise temperature.
8. Where do we use Pre-Emphasis and De-Emphasis circuit and Why?
9. Explain the difference between natural sampling and Flat-top sampling.
10. How is PDM converted to PPM wave?

PART-B

Note : Answer any Three Questions   **(3 x 18 = 54 Marks)**

11. a) Explain Weavers method for generating an SSB-SC signal with the help of a neat block diagram and relevant mathematical expressions.
    b) An AM transmitter with 20KW carrier transmits 22.4KW when modulated with a single sine wave. Calculate the modulation index, if the carrier is simultaneously modulated with another sine wave of 50% modulation. Find the total transmitted power.

12. a) Explain FM generation using indirect method.
    b) In an FM system a 7 KHz base band signal modulates 107.6 MHz, Find Carrier swing, modulation Index, highest and lowest frequencies attained by the FM signal.

13. a) Justify why local oscillator frequency is selected higher than the incoming signal Frequency.
    b) Explain the need of Amplitude limiter in FM receivers.

14. Derive the expression of SNR and Figure of Merit of an FM receiver system.

15. a) State and prove sampling theorem for low pass signals.
    b) Compare PAM, PPM and PWM.

16. a) A mixer stage has a noise figure of 25dB and a stage before it is an amplifier with a noise figure of 7dB and an available power gain of 15dB. Find out the overall noise figure referred to input.
    b) What will happen if a PM signal is received by an FM signal and vice-versa?

17. Write short notes on the following:
    a) Choice of Intermediate Frequency
    b) Quadrature null effect

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FACULTY OF ENGINEERING
B. E. 3/4 (Mech.) I – Semester (Backlog) Examination, October 2020

Subject: Hydraulic Machinery and Systems

Time : 2 Hours   **Max. Marks: 75**

PART –A

Note : Answer any Seven Questions   **(7x3 = 21 Marks)**

1   A jet of water of 10 cm diameter strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. The work done by the jet on the plate per second is
   a) 3123 N-m / sec   b) 3817 N-m / sec
   c) 3717 N-m / sec   d) 3323 N-m / sec

2   A single acting reciprocating pump is running at 50 rpm delivers 0.01 m^3/s of water. The diameter of the piston is 20 cm and stroke length 40 cm. Theoretical discharge of pump is
   a) 0.01047m^3/sec   b) 0.1047m^3/sec
   c) 1.047m^3/sec   d) 10.047m^3/sec

3   The centrifugal pump is required to deliver 150 lit/s at a head of 45 m when running at 1750 rpm. The specific speed of the pump is
   a) 18   b) 125   c) 39   d) 1260

4   A turbine develops 7457 kW under a head of 25 m while running at 135 rpm. The specific speed of turbine is
   a) 208   b) 280   c) 310   d) 300

5   A hydraulic press has a ram of 30 cm diameter and plunger of 4.5 cm diameter. Force applied at plunger is 490N then the weight lifted by press is
   a) 21.781 kN   b) 217.81 kN   c) 21.781 N   d) 217.81 N

6   For high head and low discharge, the type of pump preferred is
   a) Centrifugal pump   b) Reciprocating pump
   c) propeller pump   d) Gear pump

7   Pascal's law is applicable to
   a) Hydraulic Press   b) Hydraulic Ram
   c) Hydraulic lift   d) All the above

8   Multi stage centrifugal pumps are used to produce
   a) High head   b) High discharge
   c) both a and b   d) None of the above

9   Air vessels are used in Reciprocating pump for
   a) Continuous discharge of water   b) To save work done
   c) To avoid separation   d) all the above

10 Which of the following turbine is high head turbine
   a) Pelton turbine   b) Kaplan turbine
   c) Francis turbine   d) All the above

PART-B

Note : Answer any Three Questions   (3 x 18 = 54 Marks)

11 A jet of water of having a velocity of 20 m/sec strikes a curved vane, which is moving with a velocity of 10 m/sec. The jet makes an angle of 20° with the direction of motion of vane at inlet and leaves at an angle of 130° with the direction of motion of vane at outlet. Calculate
 i) Vane angles so that the water enters and leaves the vane without shock.
 ii) Work done per second per unit weight of water striking the vane.

12 The internal and external diameters of the impeller of a centrifugal pump are 20 cm and 40 cm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per kg of water.

13 A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 liters/s under a head of 30 meters. The buckets deflect the jet through an angle of 160°. Determine the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.

14 A single acting reciprocating pump has piston diameter 15 cm and stroke length 30 cm. The centre of the pump is 5 m above the water level in the sump. The diameter and length of the suction pipe are 10 cm and 8 m resp. The separation occurs if the absolute pressure head in the cylinder falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head as 10.3 m of water.

15 With a neat sketch explain the working of gear pump.

16 (a) Explain the working of single acting reciprocating pump with help of neat sketch.
     (b) Write about characteristic curves of a centrifugal pump.

17 (a) Write the differences between impulse and reaction turbines.
     (b) Derive the expression for force exerted by jet on a stationary flat plate.

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FACULTY OF ENGINEERING

B.E. 3/4 (Prod.) I – Semester (Backlog) Examination, October 2020

Subject: Machine Tool Engineering

Time: 2 hours   Max. Marks: 75

Note: Answer any seven questions from Part-A. Answer any three questions from Part-B.

PART – A (7X3 = 21Marks)

1. Differentiate between orthogonal cutting and oblique cutting.

2. Sketch % distribution of heat vs time between tool, work and chip.

3. State four main properties of cutting tool materials.

4. Explain the chip formation mechanism and mention the types of chips.

5. List the 8 various operations performed on lathe.

6. Sketch (i) counterbore, (ii) counter-sink, (iii) spot face operation.

7. List out the milling attachments for milling machine.

8. State six methods of gear machining.

9. Write the meaning of grinding wheel **A24K7V**? Specifications.

10. What are features of CNC machining used for machining operations?

PART – B (3X18 = 54Marks)

11. (a) Show that the shear angle, is expressed as $\tan \phi = \dfrac{r \cos a}{1 - r \sin 0}$.

    (b) A mild steel bar of 50mm diameter was orthogonally machined on lathe. Chip thickness before cut 0.5 mm, chip thickness after cut 1.2mm, rotational speed 100 RPM and rake angle 14^0; Calculate chip thickness ratio and shear angle.

12. (a) Sketch a single point cutting tool and give tool signature.

    (b) Explain Taylor's Tool life equation and its four limitations.

13. (a) Sketch 8 different types of turning operations conducted on lathe machine.

    (b) Explain with neat sketches the 4 different attachment used in lathe machine.

14. (a) What are the tool holding devices used in milling? Explain their application.

    (b) Explain the gear hobbing mechanism with neat sketch.

15. (a) sketch (i) external centre-less grinding (ii) internal on-centre and off-centre grinding.

    (b) Explain the features of APT language. Explain with diagram 5 APT statements.

16. (a) Write different abrasives used in preparation of grinding wheels.

    (b) Explain the tool holding devices used for lathe operations.

17. (a) Draw a neat sketch of twist and indicate is parts in all 3 views.

    (b) State four differences between peripheral and face milling operations.

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FACULTY OF ENGINEERING

B. E. 3/4 (AE) I – Semester (Backlog) Examination, October 2020

Subject: Automotive Chassis Components

Time: 2 hours   Max. Marks: 75

Note: Answer any seven questions from Part-A, & any three questions from Part-B.

PART – A (7X3 = 21Marks)

1. Draw a simple sketch of a ladder frame and state the functions of each member.
2. Sketch the layout of the power flow for a front engine and front wheel drive vehicle and mark the main components.
3. Name the types of front axles.
4. What is irreversible steering? Where it is preferred?
5. Brief about types of final drive.
6. Why differential locks essential for automobile?
7. Compare rigid axle's suspension with independent suspension.
8. Write the advantages of coil spring over leaf spring with respect to suspension design.
9. Compare disc brake and drum brake.
10. What is meant by stopping distance?

PART – B (3X18 = 54Marks)

11. Describe about types of chassis layout with reference to number of wheels, vehicle body and drive with neat sketches.
12. (a) With suitable diagram explain Ackerman's steering geometry.
    (b) Explain the construction and working principle of rack and pinion type steering gear box.
13. Describe about Hotchkiss drive and torque tube drive with sketches.
14. (a) Explain Front independent suspension system for front wheel drive vehicles.
    (b) Explain Anti-rolling bar with neat sketch.
15. (a) Explain the hydraulic braking system with its limitations.
    (b) Discuss the exhaust braking system with neat diagram.
16. Write short notes on the following:
    (a) Anti-lock braking system.
    (b) Parking brakes.
17. Explain about the construction and working of semi-floating, three-quarter floating and fully floating axles with neat sketches.

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FACULTY OF ENGINEERING
B.E. 3/4 (CSE) I Semester (Backlog) Examination, October 2020

Subject: Software Engineering

Time: 2 hours   Max. Marks: 75

Note: Answer any seven questions from Part-A, & any three questions from Part-B.

PART – A (7X3 = 21Marks)

1 Define the following terms: (a) Software Engineering (b) System Engineering
2 List and briefly explain any three planning principles.
3 What is a tactic? How is different from a pattern?
4 What do you mean by risk mitigation?
5 Differentiate between module cohesion and module coupling.
6 What is Object Constraint Language (OCL)?
7 What do you mean by Software Requirements Specification (SRS)? What does this document contain? What are its desirable properties?
8 What is debugging? How is different from testing?
9 What is Software Configuration Management (SCM)? Why is it needed?
10 What is a metric in software? List any three metrics for software maintenance.

PART – B (3X18 = 54Marks)

11 (a) What do various levels of CMM represent? What are the key Process Areas
        associated with each level of CMM?
   (b) Discuss the traditional Waterfall model in detail?

12 (a) List various requirements engineering tasks. Explain about inception in detail.
   (b) What is Effort Estimation? Explain the various techniques of Effort Estimation?

13 (a) What are Design Classes? What are the four characteristics of a well formed
        Design class?
   (b) Explain Scenario- Based modeling concepts with an example?

14 (a) Distinguish between the following architectural styles with examples.
        (i) Data Centered Architecture (ii) Data Flow Architecture (iii) Layered Architecture
   (b) Explain in detail the Interface Analysis & Design Models? Also discuss the phases
        of User Interface Design process?

15 (a) Briefly explain the different kinds of metrics that are useful for testing?
   (b) What are testing patterns?
   (c) What is validation testing?

16 (a) Differentiate between the terms Architectural Style, Architectural Pattern &
        Framework?
   (b) What is a Context Level DFD? Give an example.
   (c) What is a use case? Give an example.

17 (a) List any five Agile Principles and explain them in your own words.
   (b) Discuss the concept of Extreme Programming (XP) model with the help of a
        diagram. List any three strengths and weaknesses of the model.

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FACULTY OF ENGINEERING
B.E 3/4 (I.T.) I – Semester (Backlog) Examinations, October 2020

Subject: Software Engineering

Time: 2 hours   **Max. Marks: 75**

Note: Answer any seven questions from Part-A, & any three questions from Part-B.

PART – A (7X3 = 21Marks)

1. What is software process? And list activities involved in it.
2. Briefly explain about Unified process.
3. Differentiate TSP and PSP.
4. Write about scenario based modeling.
5. Define software architecture?
6. What is Quality function deployment (QFD)?
7. Write short notes on SQA.
8. Explain validation testing in detail.
9. What is metric? And explain the need of metric in SE.
10. Define Software risks? And list risk strategies.

PART – B (3X18 = 54Marks)

11. a) Explain about requirement engineering in detail.
    b) Discuss in detail about evolutionary process model.

12. Explain different architecture styles in detail.

13. a) What is debugging? And explain debugging procedure.

    b) What is software reliability? Discuss about different measures of reliability and availability.

14. Define SCM repository? And explain about SCM in Detail.

15. a) Explain the concept of COCOCMO model.

    b) Write short notes on RMMM plan.

16. a) Define SPI process? And explain its importance in Software Engineering.

    b) Explain about metric for maintenance.

17. Write Short notes on

    a) Integration Testing.

    b) CMMI.

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FACULTY OF ENGINEERING

B. E. (Civil) (CBCS) V – Semester (Backlog) Examination, October 2020
Subject: Hydraulic Machines

Time: 2hours   **Max. Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1. Differentiate between Reynolds number and Weber number.
2. The force analysis on a curved vane is understood using_____
   (a) Velocity triangles.
   (b) Angle of the plate.
   (c) Vane angles.
   (d) Plate dimension.
3. The force exerted by a jet of water in the direction of jet on a stationary curved plate is

   (a) $\rho\, av^2$ (b) $\rho\, av^2 \sin^2 2\theta$ (c) $\rho\, av^2(1+\cos\theta)$ (d) $\rho\, av^2(1+\sin\theta)$
4. A hydraulic turbine has a discharge of 5 m³/s, when operating under a head of 20 m with a speed of 500 rpm. If it is to be operated under a head of 15 m for the same discharge, the rotational speed in rpm approximately be
   (a) 433 (b) 403 (c) 627 (d) 388 (e) The velocity 'v' of a particle depends upon the time 't'

   according to the equation $v = \sqrt{ab} + bt + \dfrac{c}{d+t}$.

   Determine the units of a, b, c and d. What physical quantities they represent. All have SI units.
5. Highlight the various classifications of Hydraulic turbines.
6. Write the Euler head equation of centrifugal pump and explain each term.
7. Distinguish specific speed and unit quantities, how are they useful.
8. Draw the velocity triangles for Francis turbine.
9. State the advantages of Reciprocating pumps.
10. State the functions of impeller and foot valve in centrifugal pump.

PART – B (4X15= 60 Marks)

11. (a) The power input P to a centrifugal pump is assumed to be a function of the volume flow Q, impeller diameter D, rotational rate $, and the density and viscosity of the fluid. Rewrite this as a dimensionless relationship. Hint: Take $, ρ, and D as repeating variables.

    (b) A copepod is a water crustacean approximately 1 mm in diameter. We want to know the drag force on the copepod when it moves slowly in fresh water. A scale model 100 times larger is made and tested in glycering at velocity 'v' 30 cm/s. The measured drag on the model is 1.3 N. For similar conditions, what are the velocity and drag of the actual copepod in water? Assume that the temperate is 20⁰C.

12. (a) A jet of water 50 mm in diameter and having a velocity of 25 m/s enters tangentially a stationary curved vane without shock and is deflected through an angle of 45 degrees. Because of the friction over the surface, the exit velocity is 80% of the inlet velocity. Find the magnitude and direction of the resultant force on the vane.

(b) 75 mm diameter jet of an oil having specific gravity 0.8 strikes normally a stationary flat plate. If the force exerted by the jet on the plate is 1200 N, find the volume flow rate of the oil.

13. (a) Discuss the performance characteristic curves for turbines with neat diagrams.

(b) A reaction turbine works at 450 rpm under head of 120 m. Its diameter is at inlet is 1.2 m and flow area is 0.4 m^2. Than ales made by absolute and relative velocities at inlet is 1.2m and flow area is 0.4 m^2. Than ales made by absolute and relative velocities at inlet are 20^0 and 60^0 respectively. Determine
    (i) Volume rate of flow.
    (ii) Power Developed.
    (iii) Hydraulic efficiency.

14. (a) Define the terms (i) Manometric efficiency (ii) Mechanical efficiency (iii) Work done in case of Centrifugal pump.

(b) A centrifugal pump working in a dock pump 1565 1t/s against a mean lift of 6.1 m, when the impeller rotates at 200 rpm. The impeller diameter is 1.22 m and the area at outer periphery is 6450 Square Centimeters. If the vanes are set back at angle of 26^0 at outlet, determine
    (i) Hydraulic efficiency.
    (ii) Power requirement.
    (iii) Minimum starting speed if a ratio of Ext/Inter diameter is 2.

15. (a) What are Indicator Diagrams. Discuss the effect of Acceleration on indicator diagram.

(b) Define the term NPSH. Discuss the various provisions required for prevention of Cavitation.

16. (a) With usual notation Develop equation for specific speed for a turbine Ns= where P is power, N is speed, H is head.

(b) Derive the draft tube efficiency formula in case of reaction turbine and state the functions.

17. Write short notes on the following:

a) Pumps in series and parallel

(b) Distorted model.

(c) Tangential and Radial flow turbines.

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FACULTY OF ENGINEERING

B.E. V – Semester (EEE/Inst.) (CBCS)(Backlog) Examination, October 2020

Subject: Linear Control Systems

Time: 2 Hours   **Max. Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1) How DC servo motor is different from normal DC motor?

2) What is the electrical analogue of force, velocity, mass, mass, damper and spring in force voltage analogy?

3) How to determine transient response and steady state response?

4) What is the effect of PI controller on band width and steady state error?

5) Examine the stability of the system whose characteristic equation is
$S^5 + 4S^4 + 8S^3 + 8S^2 + 7S + 4 = 0$ using Routh Hurwitz criterion.

6) What are the necessary conditions that break away points must satisfy? Will it be sufficient also!

7) Define principle of argument.

8) Draw the frequency response of lead compensator.

9) Define controllability.

10) $A = \begin{bmatrix} 0 & 1 \\ 0 & -2 \end{bmatrix}$ Determine state transition matrix.

PART – B (4X15= 60 Marks)

11. a) Derive the transfer function for armature controlled DC servo motor.

    b) Obtain force voltage analogous circuit for the system shown below.
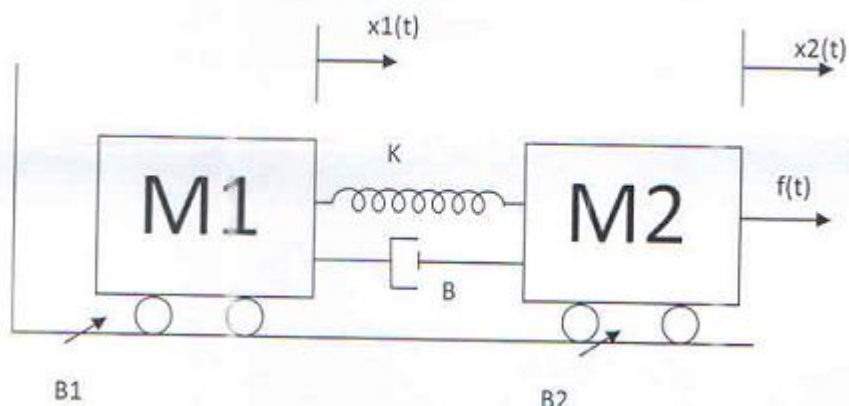
12. (i) A unity feedback system has the forward path transfer function

$(s) = \dfrac{k(2s+1)}{s(5s+1)(1+s)}$, the input r(t) = 1+6t is applied to the system. Find the value of

K, which makes steady state error equal to 0.1?

(ii) The open lop transfer function of a unity feedback control system is given by

$G(s) = \dfrac{K}{(1+sT)}$ By what factor the amplifier gain K should be multiplied so that

damping ratio is increased from 0.2 to 0.8.

13. Draw the root locus of the unity feedback system whose open loop transfer function is

$G(s) = \dfrac{K}{s(s+2)(s^2+6s+25)}$

Determine and mark the centroid, break away points, angle of departure and intersection of imaginary axis on the plot.

14. By use of Nyquist criterion, determine whether the closed loop system having the

following open loop transfer function is stable or not. If not, how many closed loop

poles lie in the right half S-plane? $G(s) = \dfrac{s+9}{(s^2+9)(s+2)}$

15. A system has GH(s) = $\dfrac{K}{[s(1+s)(1+0.1s)(1+0.02s)]}$, Determine the value of K so that

(i) Gain margin is +10db

(ii) Phase margin is +25 degrees using Bode plot.

16. For a system represented by the state equation $X^7 = AX$

The response of $x(t) = \begin{bmatrix} e^{-2t} \\ -2e^{-2t} \end{bmatrix}$ when $x(0) = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ and

$x(t) = \begin{bmatrix} e^{-t} \\ -e^{-t} \end{bmatrix}$ when $x(0) = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ Determine system matrix A.

17. a) List the steps to design a lead compensator.

b) Consider the closed loop system given by $\dfrac{C(s)}{R(s)} = \dfrac{50}{(s^2+S+50)}$

Determine the following step response specifications?

i) Undamped frequency ii) Damped frequency iii) rise time   iv) peak overshoot

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FACULTY OF ENGINEERING

B.E. (ECE) V – Semester (CBCS) Examination, October 2020

Subject: Automatic Control Systems

Time: 2 hours   **Max. Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

### PART – A (5X2 = 10 Marks)

1. Define Transfer function and mention its applicability in Control system.

2. What are the standard test signals used for time domain analysis?

3. What are the different types of error constants?

4. Define the following terms.

    i)   Peak time   ii) Peak overshoot

    iii) Rise time   iv) Settling time

5. Define Phase Margin and Gain margin w.r.t. Bode Plot.

6. Classify various types of Compensators and discuss briefly.

7. What are the advantages of digital controller over analog controller?

8. Draw the circuit of basic digital control systems and obtain its transfer function.

9. Define State and State variables.

10. What is Duality property in Controllability and Observability?

PART – B (4X15= 60 Marks)

11 a) Classify various types of Control Systems.

b) Find the transfer function of the system shown in fig.
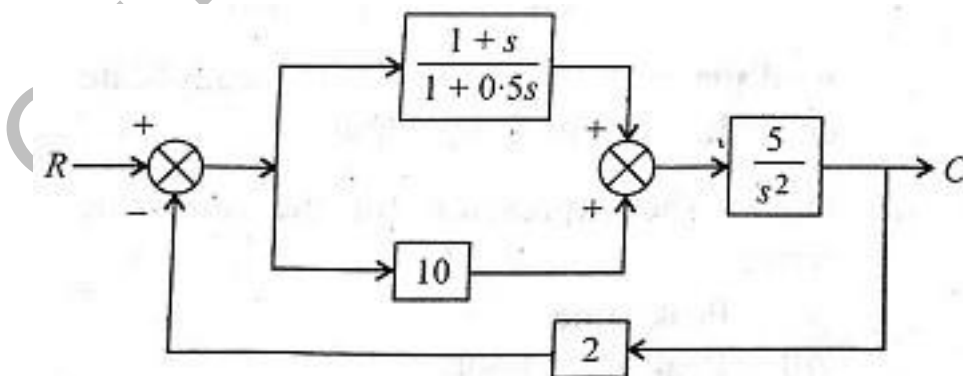
12. The dynamic behavior of a complex business organization is represented by a linear negative feedback control system shown in figure. Sketch the Root locus of the system when the parameter "k" is changing from zero to infinity neglecting the disturbance $T_d(s)$ in the organization.
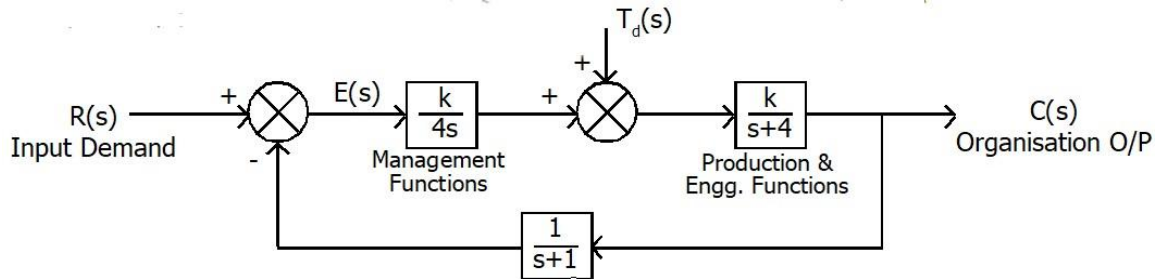
Hence determine value of "k" which causes instability in system.

13 Analyze on Lead, lag and lead-lag Compensators with neat block diagram. Also explain their importance.

14 Explain sampled data system and derive its transfer function. With an aid of block diagram show basic elements of a sampled data control system and give functioning of these elements.

15 a) What are the drawbacks of transfer function method over State variable approach.

(b) What is Controllability and Observability and how they can be determined mathematically?

16 a) What will be the stability of the system when the roots of the characteristic equation are lying on imaginary axis.

b) Determine State Controllability and Observability of the system described by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix} u \quad y = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}.$$

17 Write Short notes on:

a) Generalized Error coefficients

b) Comparison of Time domain and Frequency domain.

c) Conventional Control theory Vs Modern Control theory.

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FACULTY OF ENGINEERING

B.E. (M/P) V – Semester (CBCS) (Backlog) Examination, October 2020

Subject: Machine Design

Time: 2 Hours   **Max.Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1 State the importance of Wahl's stress factor in the design of helical springs.

2 What is nipping and express its importance in leaf spring.

3 Why dedendum value is more than addendum value?

4 When do we use bevel gear?

5 Define the following terms of Journal bearing
   a) Bearing characteristic number
   b) Bearing modulus

6 In what ways, rolling contact bearing are differed from sliding contact bearing

7 State the various types of crank shaft.

8 What are the assumptions of a curved beam?

9 What is the function of a connecting rod of an internal combustion engine?

10 What kind of contact occurred between worm and worm wheel? How does this differ from other gears?

PART – B (4x15 = 60 Marks)

11. A composite spring has two closed coiled helical springs. The outer spring is 15mm larger than the inner spring. The outer spring has 10 coils of mean diameter 40mm and wire diameter 5mm The inner spring has 8 coils of mean diameter 30mm and wire diameter 4 mm When the spring is subjected to an axial load of 400N. Find
   a) Compression of each spring
   b) Load shared by each spring
   c) Shear stress induced in each spring. The modulus of rigidity may be taken as   84 KN/mm².

12. Spur gears is to transmit 20KW when the pinion rotates 300r.p.m. The velocity ratio is 1:3 The allowable static stresses for the pinion and gear materials are 120MPa and 100MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine. module and face width. Taking into consideration of the dynamic loading. The tooth form factor y can be taken as

    $Y = 0.154 - 0.912 / \text{number of teeth}$

    Velocity factor $C_V = 3 / (3 + V)$,

where V is the pitch line velocity In m/S

13. A full journal bearing of 50mm diameter and 100mm length has a bearing pressure of 1.4N/mm^2 .The speed of the journal is 900r.p.m. and the ratio of journal diameter to diametral clearance is 1000. The absolute viscosity of the oil at the operating temperature of 75°C is 0.0111Kg/m-sec. If the room temperature is 35°C find the amount of artificial cooling required. Factor for end leakage is 0.002, Heat dissipation coefficient is 280W/m^2/° C.

14 A truck spring has 12 numbers of leaves, two of which are full length leaves. The spring supports are 1.05m apart and the central band is 85mm wide. The central band is to be 5.4KN with a permissible stress of 280MPa. Determine the thickness and width of the steel spring leaves. The ratio of the total depth to the width of the spring also determines the deflection of the spring.

15 A worm drive transmits 15kW at 2000r.p.m. to a machine carriage at 75r.p.m. The worm is triple threaded and has 65mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to be 20° full depth involute. The coefficient of friction between the mating teeth may be taken as 0.10. Calculate: 1. tangential force acting on the worm; 2. axial thrust and separating force on worm; and 3. efficiency of the worm drive.

16 Find the load carrying capacity of a trapezoidal cross sectioned crane hook. The radius of curvature of the inner fiber is 50mm.Yield strength of the material is 250Mpa.Use factor of safety of 2 and Choose suitable dimensions of the section.

17 Describe the strength and wear considerations in the design of (a) Spin gear (b) Wohm gear.

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FACULTY OF ENGINEERING
B.E. (CSE) V - Semester (CBCS) (Backlog) Examination, October 2020

Subject : Operating Systems

Time: 2 Hours   **Max.Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1   List the various criteria for CPU scheduling.

2   State the necessary conditions that lead to a deadlock.

3   Define Virtual memory.

4   Consider a paging system with the page table stored in memory. If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?

5   Distinguish between blocking and non-blocking I/O.

6   Write down the Characteristics of I/O devices.

7   What are the strengths and weaknesses of implementing access matrix using Access lists?

8   Enumerate the various Security violation methods.

9   What are the components of Linux system?
10 What is kerberos server?

PART – B (4x15 = 60 Marks)
11 (a) Write in short about the various Inter-process communication techniques.
   (b) Consider the following snapshot of a system.

	Allocation A B C D	Max A B C D	Available A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following question using banker's algorithm
(a) What is the content of the matrix Need?
(b) Is the system in a safe state?
(c) If a request from process p1 arrives for (0,4,2,0) can the request be granted immediately?

..2

12 (a) For a single -level page table system, with the page table stored in memory. If the hit ratio to a TLB is 80%, and it takes 15 nanoseconds to search the TLB, and 150 nanoseconds to access the main memory, then what is the effective memory access time in nanoseconds?

(b) Explain FIFO & LRU Page replacement algorithms with appropriate examples.

13 (a) State and explain various components of a file system.

(b) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
(i) FCFS   (ii) SSTF   (iii) SCAN iv) LOOK

14 (a) How is the access matrix useful in providing protection?

(b) Explain how Revocation of Access Rights can be performed.

15 (a) Explain Completely Fair Scheduler (CFS) implemented by LINUX kernel.

(b) What are the Networking protocols and mechanisms implemented by Windows 7?

16 (a) Discuss briefly on the various Deadlock Prevention& Avoidance techniques.

(b) What is thrashing? How it can be prevented?

17 (a) Discuss about the various Program Threats.

(b) Enumerate the various Design principles of Windows 7.

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FACULTY OF INFORMATICS

BE V Semester (CBCS)(I.T)(Backlog) Examination, October 2020

Subject: Operating Systems

Time: 2 Hours   **Max. Marks: 70**

Note: Answer any five questions from Part-A. Answer any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1) What is dual mode operation?

2) Explain process states

3) Define load balancing.

4) Define deadlock, starvation and Aging

5) What is Belady's Anomaly?

6) Differentiate paging and segmentation

7) Define Thrashing

8) Discuss the goals of protection

9) What are the different types of security attacks?

10) Write a short note on DMA

PART – B (4x15 = 60 Marks)

11) a) Explain two models of inter process communication

b) Explain types of system calls.12) Consider the following set of process, with the length of the CPU burst given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.
a) Draw the Gantt charts that illustrate the execution of these process using the following scheduling algorithms: FCFS, SJF, non preemptive priority (smaller priority number implies a higher priority), and RR(quantum=1).
b) What is the turnaround time, waiting time of each process for each of the scheduling algorithm?

13) a) Explain the different space allocation methods for storing files on disks and the type of the file access they support.

b) Explain how I/O requests are transformed to hardware operations.

14) Consider the following snapshot of the system

	Allocation A B C	Man ABC	Available ABC
P0	010	743	230
P1	302	020	
P2	802	600	
P3	211	011	
P4	002	431	

Answer the following using Banker's algorithm. What is the context of the matrix used:

1) If the system at safe state?

2) If the request from process p1 arrives for 0,4,2 can the request be grant immediately.

15) a)Explain reader-Writer Problem solution using semaphores.

 b) How the protection of information is implemented using Access Matrix model.

16) a) Write the RSA public key cryptography algorithm. Explain it with a simple example.

   b) Describe how firewall can be used to protect system and network.

17) Write a short note for the following:

   a) Peterson's solution

   b) Real- time CPU Scheduling

   c) Authentication

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FACULTY OF ENGINEERING

B.E. (AE) V – Semester (CBCS) (Backlog) Examination, October 2020

Subject: Design of Machine Components

Time: 2 Hours   Max.Marks: 70

Note: Answer any five questions from Part-A and any four questions from Part-B

PART – A (5x2 = 10 Marks)

1 Define the terms: (i) CODES (ii) STANDARDS as used in design.
2 What is an impact load? Give four examples.
3 What is S-N diagrams? Define endurance limit for S-N diagram of ductile material.
4 Define "Stress concentration" and "Notch sensitivity".
5 What is Kennedy key? What is its application?
6 What is splined shaft? Explain with het sketch and mention its two applications.
7 Why gaskets are provided at joints?
8 What do you understand by single start and double start threads?
9 State the terms Caulking and Fullering.
10 State the reasons as to why square threads are preferred, over V-threads, for power transmissions.

PART – B (4x15 = 60 Marks)

11 A propeller shaft subjected to 120kN axial compressive loads, and twisting moment of 240kN-m/ The propeller if fitted very close to the bearing so that the bending effect may be neglected. The external and internal diameters of the shaft are 250mm and 160mm respectively. Determine the maximum values of the compressive and shear stresses.

12 A shaft is subjected to bending moment that varies from +400N-m to -200N-m and a twisting moment at the critical section varies from 300N-m clockwise to 100N-m counter clockwise, determine the diameter of the shaft for the following data. Factor of safety = 2, ultimate strength = 260MPa, yield stress = 230MPA, endurance stress = 280MPA. Size correction factor = 0.85, surface correction factor = 0.85, fatigue stress concentration factor = 1.4.

13 A mild steel shaft rotating at 270 r.p.m is supported between two bearings 1000mm apart. It carries two pulleys A and B at distance of 400mm and 600mm respectively from left bearing. 10kW power is fed into the pulley A with a diameter of 400mm and taken out the pulley B with a diameter of 300mm by vertical belt drives having the same ration of driving tensions which was observed to be 2.5. Assuming the following working stress and design the diameter of shaft. Take tensile strength = 75N/mm^2, shear stress = 45N/mm^2.

14 Design the longitudinal joint for a 1.25m diameter steam boiler to carry a steam pressure of 2.5N/mm^2. The ultimate strength of the boiler plate may be assumed as 420MPa, crushing strength as 650MPa and shear strength as 300MPa. Take the joint efficiency as 80%. Sketch the joint with all the dimensions. Adopt the suitable factor of safety.

..2

15 Design a knuckle joint to transmit a load of 5kN. Take allowable stress values in tension and shear as 60N/mm^2 and 25N/mm^2 respectively. Draw a neat sketch of the assembly.

16 Design a cast iron protective flange coupling to connect two shafts in order to transmit 10kW sy 800 r.p.m. The following permissible stresses may be used: Permissible shear stress for shaft, bolt and key material = 35 MPa; Permissible crushing stress for bolt and key material = 60 MPa; Permissible shear stress for the cast iron = 15 MPa. Draw a neat sketch of the assembly.

17 Write short note on the following:
   i)   Compound Screw and Differential Screw.
   ii) Bolt of Uniform Strength.
   iii) Miner rule of Cumulative damage.

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