Hall Ticket Number :										

R-17

Code: 7G231

II B.Tech. I Semester Supplementary Examinations November 2020

DC Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Elaborate the significance of equalizer rings and dummy coils. 8M

   b) A series generator having a combined armature and field resistance of 0.4Ω is running at 1000 r.p.m. and delivering 5.5 kW at a terminal voltage of 110V. If the speed is raised to 1500 r.p.m. and the load is adjusted to 10 kW, find the new current and terminal voltage. Assume that the machine is working on the straight line portion of the magnetization characteristic. 6M

OR

2. a) Explain the principle of operation of DC generator and thereby encapsulate the various parts of DC machine and the material suitable for the respective part of the machine. 10M

   b) Bring out the differences between lap and wave windings. 4M

UNIT–II

3. a) With the help of neat sketches, explain the phenomenon of commutation in DC machines. State and discuss the methods adopted for minimizing sparking at the brushes. 9M

   b) A separately excited DC generator when running at 1000 rpm supply 200A at 125V. What will be the load current when the speed drops to 800 rpm if field is unchanged? Given that the armature resistance = 0.04 ohms and brush drop = 2V. 5M

OR

4. a) Derive the condition for maximum efficiency of a DC generator. 4M

   b) What is Armature Reaction and what are its adverse effects on the operation of a DC machine? Also, derive the expressions for de-magnetizing and cross-magnetizing ATs per pole in case the brushes are given a lead of θ degrees from GNA in case of generator. 10M

UNIT–III

5. a) Explain the voltage build-up process in DC shunt generators. Also, explain the various possible reasons for failure of voltage build-up process. 7M

   b) Illustrate the external characteristics of shunt, series and compound generators and thereby list out the applications of each. 7M

OR

6. a) "A self excited DC shunt generator has drooping characteristic". Explain. Even though the characteristic is drooping, it is used for constant voltage applications. Why? 6M

   b) Two shunt generators are operating in parallel. The e.m.f. induced in one of the machine is 260 V and that induced in the other machine is 270 V. They supply together a load current of 1800A. If each machine has an internal resistance of 0.04 Ω and field resistance of 50 Ω, determine i) terminal voltage and ii) output of each machine. 8M

UNIT–IV

7. a) On what factors does the speed of DC motor depend? Describe the method of controlling the speed of a DC shunt motor for obtaining the speeds above base speed. 8M

   b) Illustrate the significance of a starter. Bring out the significance of protective devices used in a starter. 6M

OR

8. a) A 440 V DC shunt motor takes 4 A at no-load. Its armature and field resistances are 0.4 Ω and 220 Ω respectively. Estimate the kW output and efficiency when the machine takes 60 A on full-load. Find also the percentage change in speed from no-load to full-load. 8M

   b) Explain the self-relieving property of DC motors. 6M

UNIT–V

9. a) Under what circumstances the Swinburne's test is preferred over other methods of testing DC machines. 5M

   b) Hopkinson's test was conducted on two shunt motors. The supply current was 15A at 200V. The generator output current was 85A. The field currents of motor and generator were 2.5A and 3A respectively. The armature resistance of each machine was 0.05Ω. Find the efficiency of each machine under the above loading conditions. 9M

OR

10. a) What is the necessity of testing DC machines? Elaborate on the method of testing preferred in the kind of situations. 6M

    b) Describe the method of testing large Series machines. Bring out the advantages and disadvantages of the test. 8M

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Hall Ticket Number :										

R-17

Code: 7GC32

II B.Tech. I Semester Supplementary Examinations November 2020

Engineering Mathematics – III

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Find a root of the equation $x^3 - x - 11 = 0$ by using Bisection method.

   b) Find a root of the equation $3x = \cos x + 1$ by Newton-Raphson method, correct to three decimal places.

OR

2. a) Apply Euler's method to solve for y when $x = 0.6$ given that $y' = 1 - 2xy,\ y(0) = 0.$

   b) Using Runge-Kutta method of order 4, compute $y(0.2)$ from

$$10\frac{dy}{dx} = x^2 + y^2,\ y(0) = 1,\ h = 0.1.$$

UNIT–II

3. a) Find the missing term in the following table using Lagrange's interpolation

x	1	2	4	5	6
y	14	15	5	-	9

   b) From the following table, estimate the number of students who obtained marks between 40 and 45.

Marks	30-40	40-50	50-60	60-70	70-80
Number of Students	31	42	51	35	31

OR

4. a) Evaluate $\int_0^1 \frac{1}{1+x^2}dx,$ by using Trapezoidal rule with $h = 0.2.$ Hence determine the value of ®.

   b) Compute the value of $\int_{0.2}^{1.4} (\sin x - \log x + e^x)dx$ using Simpson's $3/8^{\text{th}}$ rule.

UNIT–III

5. a) Find the least squares fit of the form $y = a_0 + a_1 x^2$ to the following data

x	-1	0	1	2
y	2	5	3	0

   b) Solve : $xp - yq = y^2 - x^2.$

OR

6. a) Fit a curve of the form $y = ae^{bx}$ to the following data.

x	0	1	2	3
y	1.05	2.10	3.85	8.30

   b) Using method of separation of variables, Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y},$ given that $u(0, y) = 8e^{-3y}.$

UNIT–IV

7. a) If $f(x)=\begin{cases}-x, & -\pi < x < 0\\ x, & 0 < x < \pi.\end{cases}$

then show that $f(x)=\frac{\pi}{2}-\frac{4}{\pi}\left[\frac{1}{1^2}\cos x+\frac{1}{3^2}\cos 3x+\frac{1}{5^2}\cos 5x+\cdots\right]$.

b) Find a Fourier series to represent $f(x)=|\sin x|$ in the interval $-\pi < x < \pi$.

OR

8. a) Obtain the half range sine series for e^x in $0 < x < 1$.

b) Find the Half range cosine series for the function $f(x)=(x-1)^2$ in the interval $0 < x < 1$.

UNIT–V

9. a) Find the Fourier transform of $f(x)=\begin{cases}1 & \text{for } |x|<1\\ 0 & \text{for } |x|>1.\end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin x}{x}dx$.

b) Find the Fourier Cosine transform of $f(x)=\begin{cases}x, & 0<x<1\\ 2-x, & 1<x<2\\ 0, & x>2\end{cases}$.

OR

10. a) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$.

b) Show that the inverse finite Fourier sine transform of $F_s(n)=\frac{1}{\pi}\left\{1+\cos n\pi-2\cos\frac{n\pi}{2}\right\}$ is

$f(x)=\begin{cases}1, & 0<x<\pi/2\\ -1, & \pi/2<x<\pi\end{cases}$.

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Hall Ticket Number :										

R-17

Code: 7G536

II B.Tech. I Semester Supplementary Examinations November 2020

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Define the terms: (i) absolute pressure (ii) Gauge Pressure (iii) vacuum pressure 7M

   b) A triangular plate of base width 1.5 m and height 2 m lies immersed in water with the apex downwards. The base of the plate is 1 m below and parallel to the free water surface. Calculate the total pressure on the plate and the depth of the center of pressure 7M

OR

2. a) Calculate the shear stress developed in oil of viscosity 1.4 poise, used for lubricating the clearance between a shaft of diameter 15 cm and its journal bearing. The shaft rotates at 175 rpm and clearance is 1.5 mm. 7M

   b) A fan delivers 4 m^3 of air per second at 20^0C and 1.25 bar. Assuming molecular weight of air as 28.97, calculate the mass of air delivered. Also determine the density, specific volume and specific weight of the air being delivered 7M

UNIT–II

3. a) Explain (i) Stream line (ii) vorticity (iii) Irrotational Flow (iv) Streak line 4M

   b) Derive the Bernoulli's equation from the Euler's equation. 10M

OR

4. a) Explain Hydraulic Gradient Line and Total Energy Line 4M

   b) Pipe of 0.6m diameter is1.5km long. In order to augment the discharge, another pipe of the same dia is introduced parallel to the first in the second-half of the length. Neglecting minor losses, find increase in discharge if friction factor is 0.04. Assume a level difference of 30m at inlet & outlet of the pipe. 10M

UNIT–III

5. a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet. 7M

   b) jet of water of diameter 60 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 550. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet. 7M

OR

6. a) State the momentum equation; In what way does it differ from impulse momentum equation. Mention some of its engineering applications. 7M

   b) A venturimeter of 20 cm × 10 cm size is calibrated in a laboratory using a right angled V notch. When a steady head of 0.187 m is maintained over the notch with a coefficient of discharge 0.6, the difference of head between he entrance and throat section of the Venturimeter is found to be 39 cm head of the fluid measured using notch as actual flow, determine the discharge coefficient of venturimeter. 7M

UNIT–IV

7. a) Show that for the maximum efficiency, the bucket speed of a pelton wheel should be equal to one half of the jet speed. 7M

   b) A hydraulic turbine under a head of 25 metres develops 7260 kW running at 110 rpm. What is the specific speed of the turbine? What type of turbine is this? Find also the normal speed and output if the head on the turbine is reduced to 20 metres. 7M

OR

8. a) Reaction turbine works at 460 rpm under a head of 110 metres. Its diameter at inlet is 1150 mm and the flow area is 0.03 metre^2. The angles made by the absolute velocity and relative velocity at inlet are respectively 180 and 500 with the tangential velocity. Determine (i) The volume flow rate (ii) The power developed (iii) The efficiency. Assume whirl at outlet to be zero 7M

   b) A turbine develops 7725 kW under a head of 28 metres at 140 rpm. Calculate the specific speed of the turbine and state the type of turbine. 7M

UNIT–V

9. a) Single – acting reciprocating pump running at 50rpm, delivers 0.01 m^3/s of water. The diameter of the piston is 200mm and stroke length 400mm. determine the theoretical discharge of the pump and co-efficient of discharge, and slip and the percentage slip of the pump. 8M

   b) Differentiate between reciprocating pump and centrifugal pump. 6M

OR

10. a) A centrifugal pump discharge 560 liters of water per second has to develop a head of 10 meters, the speed of rotation of the impeller being 700rpm. The manometric efficiency is 85% and the loss of head in the pump due to friction is 0.025 V1 2 meters of water, where V1 is the velocity with which the water leaves the impeller. Assume that the velocity of flow through the impeller is constant at 2.50 meters per second and that there is no velocity of whirl at inlet. Determine (i) The diameter of the impeller (ii) the outlet area (iii) The vane angle at the outlet edge of the impeller. 7M

    b) A single acting reciprocating pump has a plunger of diameter 0.3m and stroke of length 0.4m. If the speed of the pump is 60 rpm and coefficient of discharge is 0.97, determine the percentage slip and actual discharge of the pump. 7M

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Hall Ticket Number :										

R-17

Code: 7G232

II B.Tech. I Semester Supplementary Examinations November 2020

Switching Theory and Logic Design

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain error correction and error detection codes with examples? 6M

   b) Distinguish between weighted and non-weighted codes with examples. 4M

   c) What is the advantage of 2's complement representation in computers? Perform the following operations using 2's complement method:

      i. (+55) – (+15)

      ii. (-55) – (-15) 4M

OR

2. a) i. Write the properties of XOR gate.

      ii. Prove the Boolean identity X+YZ = (X+Y) (X+Z). 8M

   b) Simplify the following Boolean functions to minimum number of literals.

      i. xyz + x1y + xyz1

      ii. xz + x1yz 6M

UNIT–II

3. a) Prove that AND-OR network is equivalent to NAND-NAND network. 6M

   b) Develop a circuit for each of the following Boolean expression using only NAND gates

      i. Y= (A+C) (B+D)

      ii. Y=AB(C+D) 8M

OR

4. a) Simplify the following Boolean function for minimal POS form using K-map and implement Using NOR gates.

      F (W, X, Y, Z) = Σ (1, 2, 5, 6, 9) + d (10, 11, 12, 13, 14, 15) 7M

   b) Simplify F = Σm (0, 1, 4, 5, 6, 9, 11, 12, 13, 14, 15) +Σd (7, 8) using tabular method and implement using NOR gates only 7M

UNIT–III

5. a) What is magnitude comparator? Explain with circuit diagram a 1 bit magnitude comparator 7M

   b) Design 4x16 decoder using two 3x8 decoders with block diagram. 7M

OR

6. a) Implement the following function F(A,B,C,D)=Σm(0,1,3,4,7,10,12,14) using 16:1 MUX and 8:1 MUX. 8M

   b) Implement the following expressions using PROM

   F1= Σm(0, 1, 2, 4, 6, 7), F2= Σm(0, 1, 2, 4, 6,) 6M

UNIT–IV

7. a) Show how mod-12 JK counter could be built using mod-3 & mod-4 counters. 7M

   b) Draw the circuit diagram of 4 bit ring counter using D Flip-Flops and explain its operation with the help of bit pattern 7M

OR

8. a) Convert SR-Flip-Flop into JK-Flip-Flop. 7M

   b) What do you mean by triggering? Explain the various triggering modes with examples. 7M

UNIT–V

9. a) A Sequential circuit has 2 inputs $W_1 = W_2$ and an output Z. Its function is to compare the input sequence on the two inputs. If $W_1 = W_2$ during any four consecutive clock cycles, the circuit produces Z = 1 otherwise Z = 0.

   W_1 = 0110111000110 W_2 = 1110101000111 Z = 0000100001110 6M

   b) What are the Moore and Melay machines? Compare them? 5M

   c) What are the limitations of FSM 3M

OR

10. a) Construct an ASM block that has 3 input variable (A,B,C), 4 output variables(W,X,Y,Z) and 2 exit paths. For this block, output Z is always 1 and W is 1. If A and B both are 1, If C=1 and A=0, Y=1 and exit path 1 is taken. If C=0 or A=1, X=1 and exit path2 is taken, Realize the as one using PLA control and give the PLA table 8M

    b) Draw the state diagram for a full adder circuit and convert it to ASM chart. 6M

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Hall Ticket Number :										

R-17

Code: 7G334

II B.Tech. I Semester Supplementary Examinations November 2020

Analog Electronics-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Draw the small signal model of BJT in CE, CC and CB configurations using h-parameters. 10M
   b) Distinguish between Exact and approximate models of BJT using h-parameters. 4M

OR

2. Derive the expressions of current gain, voltage gain, input and output resistances, overall input and output resistances of CC amplifier using simplified model. 14M

UNIT–II

3. a) List out the Classification of feedback amplifiers 7M
   b) Derive the expression for transfer gain with feedback? 7M

OR

4. a) Derive the expressions for input impedance, output impedance for current series feedback. 7M
   b) Explain the advantages of negative feedback over positive feedback 7M

UNIT–III

5. a) Write short notes on Frequency stability of oscillators 7M
   b) Discuss about amplitude stability of oscillators. 7M

OR

6. a) What is Barkhausen criteria for oscillations. 4M
   b) Discuss about Hartley oscillator with the help of circuit diagram. 10M

UNIT–IV

7. a) List out classification of Power Amplifiers. 7M
   b) Derive the expression for efficiency of series fed Class A power amplifier 7M

OR

8. a) Explain class A power amplifier working with neat sketches and derive the expression for conversion efficiency. 7M
   b) Discuss about class B push-pull amplifier operation with neat diagrams and derive the expression for collector circuit efficiency 7M

UNIT–V

9. a) Define Non-linear wave shaping? Write short notes diode clippers. 7M
   b) Discuss about transistor clippers. 7M

OR

10. a) In a low pass RC circuit, R=2 kΩ and C= 1μF is applied as exponential input, and then determine the output wave form. 7M
    b) Explain the operation of two level slicer. 7M

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