Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

S.Y. B.Tech Correction IV

ENDSEM- REEXAMINATION (DSY) AUGUST-2022

Program: ELECTRICAL | **Duration: 03 Hours**

Course Code: BS-BTE401 | **Maximum Points: 100**

Course Name: APPLIED MATHEMATICS-IV | **Semester: IV**

- **Attempt any five out of seven questions**
- **Use of scientific calculator is allowed.**

21/8/22

QNO.	QUESTION	POINTS	CO	BL	PI
QI a)	If the mean of a binomial distribution is 3 and the variance is $3/2$, find the probability of obtaining atleast 4 success.	06	1	2	2.1.3
QI b)	The following data gives the heights in inches(X) and weights in lbs(Y) of a random sample of 9 students X: 61, 68, 68, 64, 65, 70, 63, 62, 64 Y: 112, 123, 130, 115, 110, 125, 100, 113, 116 Estimate the weight of a student with height 59 inches.	06	3	3	1.1.1
QI c)	A crv X has PDF defined as $f(x)=\begin{cases} kx, 0\le x\le 2 \\ 2k, 2\le x\le 4 \\ 6k-kx, 4\le x\le 6 \end{cases}$ .Find k, mean & $P(1\le X\le 3)$.	08	1	1	1.1.2
QII a)	In an examination it is laid down that a student passes if he secures 30% or more marks. He is placed in Ist,IInd or IIIrd division according as he secures 60% or more marks, between 45% & 60% and between 30% & 45% respectively. He gets distinction in case he secures 80% or more marks. It is noticed from the result that 10% of the students failed in the examination where as 5% of them obtained distinction. Calculate the percentage of students placed in the second division.	10	1	2	2.1.4
QII b)	A purse contains 2 silver and 4 copper coins. A second purse contains 4 silver and 3 copper coins. If a coin is pulled out at random from one of the two purses, what is the probability that it is a silver coin?	10	2	2	2.3.1

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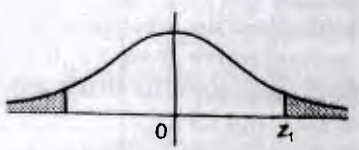
<table>
<tr><td>QIII a)</td><td>Solve using Taylor's series method $x\frac{dy}{dx} = x - y$; $y(2) = 2$, Find y at $x = 2.1$</td><td>06</td><td>1</td><td>2</td><td>1.1.2</td></tr>
<tr><td>QIII b)</td><td>The sales-data of an article in six shops before and after a special promotional campaign are as under
<table>
<tr><td>Shops</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>Before Campaign</td><td>53</td><td>28</td><td>31</td><td>48</td><td>50</td><td>42</td></tr>
<tr><td>After Campaign</td><td>58</td><td>29</td><td>30</td><td>55</td><td>56</td><td>45</td></tr>
</table>
Can the campaign be judged to be a success at 5% LOS.</td><td>06</td><td>1</td><td>2</td><td>1.1.1</td></tr>
<tr><td>QIII c)</td><td>In an examination marks obtained by students in mathematics, physics and chemistry are normally distributed with means 51,53 and 46 with standard deviations 15,12,16 respectively. Find the probability of securing total marks (i) 180 or more (ii) 90 or below</td><td>08</td><td>1</td><td>1</td><td>2.1.4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>QIV a)</td><td>The probability that a smoker aged 25 years will die before reaching the age of 30 years may be taken a 0.018. Out of a group of 400 smokers, now aged 25 years, what is the probability that 2 smokers will die within the next 5 years?</td><td>06</td><td>1</td><td>3</td><td>2.3.1</td></tr>
<tr><td>QIV b)</td><td>An urn contains 4 white and 3 red balls. Three balls are drawn with replacement, from this urn. Find μ, σ^2 and σ for the number of red balls drawn.</td><td>06</td><td>2</td><td>2</td><td>1.1.3</td></tr>
<tr><td>QIV c)</td><td>Solve the following system by Gauss – Jacobi method $10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$; $x + 6y + 10z = -3$.</td><td>08</td><td>3</td><td>1</td><td>2.3.4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>QV a)</td><td>Fit a binomial distribution for the following data and compare the theoretical frequencies with the actual ones:
<table>
<tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>f</td><td>2</td><td>14</td><td>20</td><td>34</td><td>22</td><td>8</td></tr>
</table></td><td>06</td><td>1</td><td>1</td><td>2.3.1</td></tr>
<tr><td>QV b)</td><td>A certain drug is claimed to be effective in curing cold. In an experiment on 500 persons with cold, half of them were given the drug and half of them were given sugar pills. The patients' reactions to the treatment are recorded in the following table.</td><td>06</td><td>1</td><td>2</td><td>1.1.1</td></tr>
</table>

ENDSEM- REEXAMINATION (DSY) AUGUST-2022

		Helped	Harmed	No effect			
	Drug	150	30	70			
	Sugar Pills	130	40	80			
	On the basis of this data, can it be concluded that the drug and sugar pills differ significantly in curing cold?						
QV c)	Solve, by Gauss – Seidel method, the following system: $28x + 4y - z = 32$ $x + 3y + 10z = 24$ $2x + 17y + 4z = 35$				08	3	2	2.3.4
QVI a)	Compute spearman's rank coorelation coefficient for the following data X: 18, 20, 34, 52, 12 Y: 39, 23, 35, 18, 46				06	2	1	1.1.3
QVI b)	A drug is given to 10 patients and increments in their blood pressure were recorded to be 3, 6, -2, 4, -3, 4, 0, 0, 2,6. Is it reasonable to believe that the drug has no effect on change of blood pressure?				06	1	3	2.1.3
QVI c)	Using Runge-Kutta method {IVth order} find the numerical solution at x = 0.6 for $\frac{dy}{dx} = \sqrt{x + y}$, given y(0.4) = 0.41 using h = 0.2.				08	3	1	1.1.1
QVI I a)	Using Newton-Raphson method find the root of $x \log_{10} x = 12.34$ with $x_0 = 10$ upto 3 places of decimal.				06	3	3	2.1.4
QVI I b)	Using Euler's Method find the approximate value of y at x = 1 taking h = 0.2 given that $\frac{dy}{dx} = x + y$ and y(0) = 1. Also compare it with exact value				06	2	2	1.1.3
QVI Ic)	Solve by Gauss – Elimination Method: $3x + 4y + 5z = 18, 2x - y + 8z = 13, 5x - 2y + 7z = 20.$				08	3	3	2.1.3

Percentage Points of t - distribution



Example

For Φ = 10 d. o. f.

$P(|t| > 1.812) = 0.1$

Φ \ P	0.20	0.10	0.05	0.02	0.01
1	3.078	6.314	12.706	31.812	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.287
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.325	2.576

Percentage Points of χ^2 - Distribution

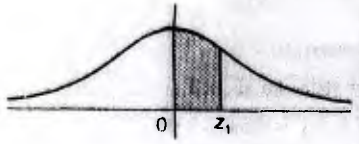
Example

For Φ = 10 d. o. f.

$P(\chi^2 > 15.99) = 0.10$

Φ \ P	0 = .99	0.95	0.50	0.10	0.05	0.02	0.01
1	000157	.00393	.455	2.706	3.841	5.214	6.635
2	.0201	.103	1.386	4.605	5.991	7.824	9.210
3	115	.352	2.366	6.251	7.815	9.837	11.341
4	297	.711	3.357	7.779	9.488	11.668	13.277
5	554	1.145	4.351	9.236	11.070	13.388	15.086
6	872	1.635	5.348	10.645	12.592	15.033	16.812
7	1.339	2.167	6.346	12.017	14.067	16.622	18.475
8	1.646	2.733	7.344	13.362	15.507	18.168	20.090
9	2.088	3.325	8.343	14.684	16.919	19.679	21.666
10	2.558	3.940	9.340	15.987	18.307	21.161	23.209
11	3.053	4.575	10.341	17.275	19.675	22.618	24.725
12	3.571	5.226	11.340	18.549	21.026	24.054	26.217
13	4.107	5.892	12.340	19.812	22.362	25.472	27.688
14	4.660	6.571	13.339	21.064	23.685	26.873	29.141
15	4.229	7.261	14.339	22.307	24.996	28.259	30.578
16	5.812	7.962	15.338	23.542	26.296	29.633	32 000
17	6.408	8.672	16.338	24.769	27.587	30.995	33.409
18	7.015	9.390	17.338	25.989	28.869	32.346	34.805
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191
20	8.260	10.851	19.337	28.412	31.410	35 020	37.566
21	8.897	11.591	20.337	29.615	32.671	36.349	38.932
22	9.542	12.338	21.337	30.813	33.924	37.659	40.289
23	10.196	13.091	22.337	32.007	35.172	38.968	41.638
24	10.856	13.848	23.337	32.196	36.415	40.270	42 980
25	11.524	14.611	24.337	34.382	37.652	41.566	44.314
26	12.198	15.379	25.336	35.363	38.885	41.856	45.642
27	12.879	18.151	26.336	36.741	40.113	44.140	46.963
28	13.565	16.928	27.336	37.916	41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42.557	46.693	49.588
30	14.953	18 493	29.336	40.256	43.773	47.962	50.892

Area Under Standard Normal Curve



The table gives the area under the standard normal curve from $z = 0$ to $z = z_1$ which is the probability that z will lie between $z = 0$ and $z = z_1$.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	0753
0.2	.0793	.8832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	1808	.1844	1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	2549
0.7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3076	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4416	4429	4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4415	.4525	.4535	4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4841	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	4952
2.6	.4953	.4955	.4956	.4957	.4959	.4560	.4961	.4962	.4963	4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	4990

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Re-exam August 2022

Program: DSY BTech Electronics Sem IV

Course Code: PC-BTE403

Course Name: Signals and Systems

Duration: 3 Hr

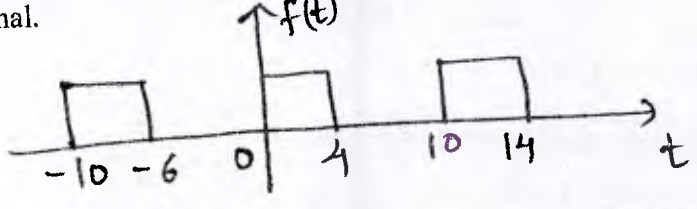
Maximum Points:100

Semester: IV

23/8/22

Note:

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- In the absence of any data, make suitable assumptions and justify the same.

Q. No.	Questions	Points	CO	BL	Module No.
1a	Classify system $y(t) = t^2 x(t)$ as static/dynamic, linear/non-linear, time-variant/invariant, causal/non-causal and stable/unstable.	05			01
1b	Consider a signal $x(n) = (0.5)^n u(n)$. Test if the signal is Energy or power signal.	05			01
1c	Determine correlation of x[n] with x[n]. $x[n] = \{4, 1, -2, 1, 5\}$.	05			01
1d	Determine output of a system if input applied is $x[n] = \{1, 2, 3, 5\}$ and impulse response is $h[n] = \{-2, 0, 4, -1\}$	05			02
2a	A system has transfer function as $H(j\omega) = \frac{j\omega+1}{(jw+4)(j\omega+6)}$. Determine its impulse response. Also evaluate the output of the system if input applied is $x(t) = e^{-4t} u(t)$.	10			03
2b	Evaluate Fourier series of following signal and determine DC component and magnitude of 3rd order harmonic present in the signal. 	10			03

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3a	Determine convolution of following signals using graphical method. $x_1[n]= 0.5^{n} u[n]$ and $x_2[n]= 0.8^{n} u[n]$	10			02
3b	Consider a system described by a difference equation y[n] + 0.2y[n-1] =5 x[n]. (Use time domain method) i) Determine Impulse response of the system ii) Determine output of the system when input x(n) = $(0.5)^{n}$ u(n) with initial output of the system y(-1) = 0.	10			02
4a	Realize given CT system in series and parallel form $H(s) = \frac{s-7}{(s-3)(s-5)(s-14)}$	10			07
4b	Obtain Direct form I and Direct form II realization of a system with transfer function $H(z) = \frac{15z^2-4z+7}{z^3-8z^2+12z-5}$.	10			07
5a	Find the inverse Laplace Transform of $X(s) = \frac{(2s+1)}{(s+2)(s+3)}$ if the convergence regions are i) -3 <Re(s)< -2 ii) Re(s)> -2 iii) Re(s)< -3	10			04
5b	Consider a LTI system represented by $\frac{d^2y}{dt^2} + 3\frac{dy}{dt} - 4y(t) = x(t)$ i) Determine its impulse response. ii) Determine output when input x (t) = e^{-4t} u (t) iii) Plot the frequency response of the system Use Laplace Transform only.	10			04
6a	Determine Inverse ZT of $X(z) = \frac{z}{(z-5)}$ using long division method if ROC is i) |z|< 5 ii) |z|> 5	10			05
6b	State and prove initial and final value theorem of Z- Transform. Hence find initial and final value of x[n] if $X(z) = \frac{z^2-5}{(z-1)(z-2)^2}$.	10			05

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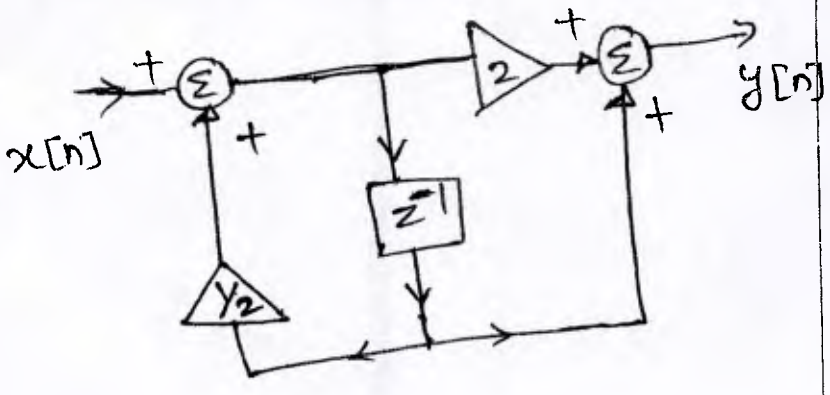
7a	A causal LTI system time described by a difference equation $$y[n] = \frac{3}{4}y[n-1] - \frac{1}{8}y[n-2] + x[n].$$ Determine Impulse response, step response. Plot pole-zero plot and comment on stability.	10			06
7b	Given a realization of a causal DT system as shown below, Obtain the transfer function of system. Draw pole-zero plot and comment on the stability of the system. 	10			02 07

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RE EXAMINATION AUG 2022

Program: S.Y. B.Tech (Electrical Sem IV)

Duration: Three Hour

Course Code: PC-BTE405

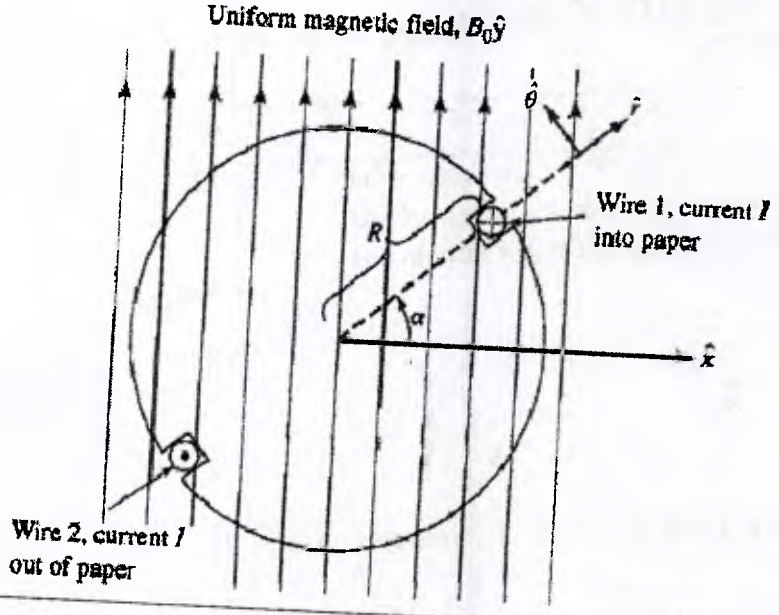
Maximum Points: 100

Course Name: Electrical Machines I

Semester: IV

24/8/22

Notes:
1. Question No 1 is compulsory..
2. Attempt any four questions out of remaining five.
2. Draw neat diagrams.
3. Assume suitable data if necessary.

Q.No.	Questions	Points	CO	BL
1.	Answer/Solve any four. a. Explain Biot Savart, Faraday's and Ampere Circuital Law b. Explain Principal of operation of Single Phase Transformer. c. Discuss Hysteresis and Eddy current losses in electromagnetic circuits. d. Explain angular slot pitch and coil span. e. Write short notes on High Frequency Transformer.	5+5+5+5		
2a	Discuss Lorentz Force Law explaining each term in the equation representing it with clarity.	08		
2.b	A non magnetic rotor containing a single turn is placed in uniform magnetic field of magnitude **Bo** as shown in figure below. The coild sides are at radius **R** and wire carries current **I** as indicated. Find the θ-directed torque as a function of rotor position **α when I = 10A, Bo = 0.02 T and R = 0.05 m.** Assume rotor is of length **l=0.3 m.** 	12		

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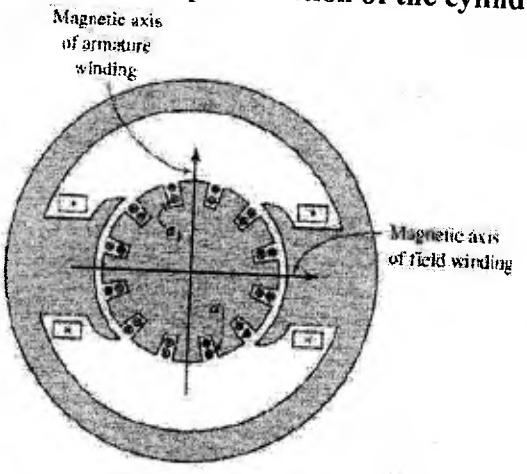
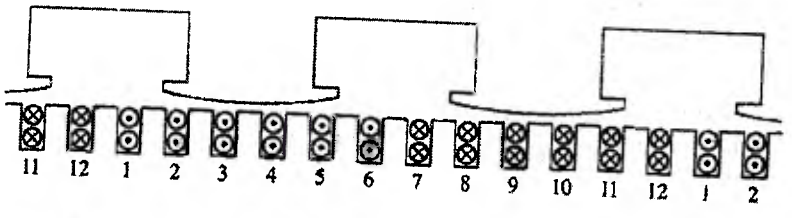
3a	Derive the conditions for maximum effeciency of the transformer..	05
3b	**Draw the spacial distribution of MMF corresponding to Fig. No. 2 which is straighten representation of the cylindrical rotor of Fig. No. 1.**  **Fig. No. 1 : Cross –Section of a Two-Pole DC Machines**  **Fig. No. 2: Developed sketch of the DC Machine of Fig. 1**	10
3c	Define all day efficiency of atransfrmer,.	05
4a	Discuss tap changing transformer.	08
4b	A DC generator has 24 armature conductors. Average e.m.f. induced in one conductor is 2V and each conductor is designed to handle a current of 5A. Calculate the rating of this generator if the number of parallel paths in this machines are a) 2 b) 4 and c) 6	12
5a	Discuss open and short circuit test for a single phase transformer. Also derive the expressions resulting from these tests.	10

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5b	A 20 KVA, 2500/250 V, 50Hz single-phase transformer gave the following test results. Open Circuit Test(on l.v. side) : 250 V, 1.4 A, 105 Watts Short Circuit Test(on h.v. side) : 104 V,8 A, 320 Watts Compute the parameters of the approximate equivalent circuit referred to high voltage and low voltage sides.	10				
6a	Discuss phasor group no 1 with various examples.	10				
6b	Discuss in details the excitation phenomenon in Transformer.	10				
7a	Discuss self excited and separately excited DC Machines in details.	10				
7b	Discuss parallel operation of three phase transformer in details.	10				