

Quality Audit and Affiliation Certificates

The college has conducted green audit and energy audit. College has got affiliation certificate from affiliating university . The certificates and report is attached.



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Mouje Sukli (Gupchup), Hingna, Nagpur-441110





AMBASELKAR ASSOCIATES LLP

REGISTERED VALUERS

- LICENSED INSURANCE SURVEYOR & LOSS ASSESSORS
- CHARTERED ENGINEERS
- ENERGY AUDITORS
- GSTIN: 27ABOFA5202H1ZK



CERTIFICATE OF GREEN AUDIT

This is to certify that the undersigned, Pranav Ambaselkar, BEE Certified Energy Auditor (EA25771), has conducted a comprehensive Green Audit for the period 2022-23 at Maharshi Karve Stree Shikshan Samstha's Educational Campus located at Mouza – Sukali Gupchup, Kh. No. 169/1, 170/1 Hingna, Nagpur.

The Green Audit report for Maharshi Karve Stree Shikshan Samstha's Educational Campus highlights key findings and recommendations for optimizing energy consumption. The analysis encompasses a detailed study of connected loads, energy consumption patterns, and usage of alternate energy sources. The report suggests practical measures, including the installation of a proposed Solar PV Plant, reduction in contract demand, and the replacement of existing DG Sets, to enhance sustainability and energy efficiency at the institution.



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Dr. Milind Khanapurkar

Dr. Millind Knahapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Women Hingna, Nagpur-441110.



Report on Green Audit for 2022-23

Maharshi Karve

Stree Shikshan Samstha's

Educational Campus

At Mouza – Sukali Gupchup, Kh. No. 169/1, 170/1 Hingna, Nagpur.



Prepared by

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Contents

ACKNOWLEDGEMENT	3
EXECUTIVE SUMMARY	4
CHAPTER-I: INTRODUCTION	6
Chapter –II: STUDY OF CONNECTED LOAD	7
Chapter – III: STUDY OF ENERGY CONSUMPTION	8
CHAPTER-V: STUDY OF USAGE OF ALTERNATE ENERGY SOURCES	12
CHAPTER VI: RECOMMENDATIONS	12
CHAPTER VII: STANDARD ENERGY SAVING MEASURES	13
CHAPTER VIII: PHOTOGRAPHS	15

List of Tables

.4
.4
.6
.7
.8
.9
.9
.4
· · ·

List of Charts

Chart 1 Connected Load Details	7
Chart 2 Annual Energy Bill Pattern	8
Chart 3 Annual Electricity consumption pattern	8
Chart 4 Annual Energy Cost Breakup	9
Chart 5 Energy Source & Cost per kg OE	9
Chart 6 Annual Energy Consumption Breakup (TOE)	10
Chart 7 Annual Carbon Footprint (Tons CO2)	10

List of Photos

Photo 1 Entrance of the Institute	6
Photo 2 Solar Water Heater	15
Photo 3 Sewage Treatment Plant	15



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We, Ambaselkar Associates LLP at Nagpur, express our sincere Gratitude to the management of Maharshi Karve Stree Shikshan Samstha's Educational Campus.

We are thankful to:

- > Dr. Milind Khanapurkar, Principal, Cummins College of Engineering for women, Hingna, Nagpur.
- > Dr. Rupa Verma, Principal, Sitabai Nargundkar college of Nursing for women, Hingna, Nagpur.

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- Mr. Prashant Supsande, Site Engineer.
- Mr. Mithun Ragenwar AAO. Cummins College.
- Mr. Ashish Chokhare AAO, Nursing College



Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Women Hingna, Nagpur-441110.

EXECUTIVE SUMMARY

1. Maharshi Karve Stree Shikshan Sanstha's Educational Campus consumes Energy in the form of Electrical Energy, LPG & Dlesel used for various gadgets, office & other facilities.

Darticulars	Energy Source			
Particulars	Electricity (MSEDCL)	LPG (Canteen)	Diesel (180kVA DG)	Total
Average Monthly Consumption	27219 kVAh	40 cylinders (19kg) =760kg	280.25 Litres Monthly	-
Annual Consumption	326633 kVAh	9120 kg	3363 Litre	•
Oil Equivalent (OE) Conversion	1kg OE = 11.63 kVAh	11kg OE = 0.87 kg LPG	1kg OE = 1.12 Litre Diesel	-
Annual Consumption Tons OE	28.09 TOE	10.48 TOE	3.00 TOE	41.63 TOE
Consumption-Previous Year	20.90 TOE	6.80 TOE	1.40 TOE	29.20 TOE

Table 1 Sources of Energy

2. Present Level of Electricity Consumption

Electricity Consumption	Units (kVAh)	Billed Demand (kVA)		Bill Amount	Cost per unit
Minimum	17064 kVAh	104	₹	3,03,006	₹15.16/kWh
Average	27219 kVAh	112	₹	4,32,606	₹15.89/kWh
Maximum	40881 kVAh	132	₹	6,23,674	₹18.02/kWh

Table 2 Electricity Consumption Analysis

3. Various Majors Adopted for Energy Conservation:

The Various projects already implemented by the college are

- Usage of Energy Efficient LED fittings 1249 nos of LEDs are already installed.
- Usage of BEE Star Rated equipment AC Star Rated ACs are installed.
- Solar water Heater Capacity 13000 Ltr/ Day.
- BLDC Fan 116 Nos.
- 4. Usage of Alternate Energy Source:

The College has installed 13000 Ltr/ Day Solar Water Heating system. The % of usage of alternate Energy Sources to annual power requirement works out to be around 30%.

5. Percentage of Lighting Power Requirements met by LED bulbs:

The Percentage of usage of LED to the total annual lighting power requirement works out to be **100% LED Light**.

- 6. Waste Management:
- 6.1. Solid waste Management:

The bio degradable waste generated is composted in a bio composting pit and the fertilizer produced is used for own garden in the premises.

6.2. Liquid waste management:

The college has installed a sewage treatment plant, wherein the liquid waste water generated in completely treated. This treated water is further used for purpose.





Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Women Hingna, Nagpur-441110.

6.3. E-Waste Management:

All the scrapped E waste is disposed as per standard process of E waste handling .

7. Rain water Harvesting :

The college has already installed Rainwater Harvesting system to transfer the Rain Water of the terrace which is collected in the main water storage tank and Bore well recharge trenches. Substantial saving of fresh water is achieved during rainy season.

- 8. Notes & Assumptions:
 - 1. 1 Unit of Electrical Energy releases 0.9 kg of CO2 INTO Atmosphere.
 - 2. 1 kWp Solar PV System generates 1300 Units (kWh) of Electrical Energy per year.
 - 3. Daily working hours 8 hrs.
 - 4. Annual working days 280 days.
- 9. ABBREVIATION
- AC : Air conditioner
- CFL : Compact fluorescent Lamp
- FTL : Fluorescent Tube Light
- LED : Light Emitting Diode
- kWh : kilo- Watt Hour
- Qty : Quantity
- W : Watt
- kW : kilo Watt
- PF : Power Factor
- MD : Maximum Demand
- PC : Personal Computer
- MT : Metric Ton.
- TOE : Ton of Oil Equivalent
- OE : Oil Equivalent (10,000kCal energy)
- kVAh : Unit of measurement of apparent electrical energy for HT



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CHAPTER-I: INTRODUCTION

- 1.1 Objectives:
 - 1. To study the present CO₂ emissions.
 - 2. To study Scope for usage of Alternate Energy Sources.
 - 3. To study Various measures to reduce the energy Consumption.

1.2 Audit Methodology:

- 1. Study of connected load & energy sources
- 2. Study of Electrical Energy Consumption pattern
- 3. Study usage of Renewable energy usage
- 4. Study of Lighting Load and Usage of LED Lights
- 5. Study of Rain Water Harvesting, Waste management
- 6. To Prepare the Report with various Energy conservation measures

1.3 General Details of College:

No	Head	Particulars
1	Name	Cummins College of Engineering for women, Nagpur &
		Sitabai Nargundkar College of Nursing for women, Nagpur.
2	Address	Hingna, Nagpur.

Table 3 General Details of Institute



Chapter –II: STUDY OF CONNECTED LOAD

In this chapter, we have presented the details of various electrical loads as under.

SN	Particulars	Nos.	Wattage	Connected Load
1	20 watt LED Light fitting - 800 Nos.	800	20W	16.00kW
2	40 Watt LED Street Light - 66 Nos.	66	40W	2.64kW
3	25 Watt LED Outdoor fitting - 32 Nos.	32	25W	0.80kW
4	15 Watt LED Panel fitting - 135 Nos.	135	15W	2.03kW
5	15 Watt LED Round fitting - 90 Nos.	90	15W	1.35kW
6	36 Watt LED fitting - 126 Nos.	126	36W	4.54kW
	Total LED Lighting	1249		
8	Air Conditioner load per day		126.750 KW	125.00kW
9	Ceiling Fan load	714 nos	49.98 kW	46.41kW
	No. of Computers Engineering College			
10	PC.	230 Nos.	approx 100W each	23.00kW
12	Laptop	7 nos.	approx 60W each	0.42kW
13	Printers	19 nos.	approx 50W each	0.95kW
	No. of Nursing College			
14	PC.	36 nos.	approx 100W each	3.60kW
15	Laptop	5 nos.	approx 60W each	0.30kW
16	Printers	7 nos.	approx 50W each	0.35kW
17	Scanner	2 nos.	approx 15W each	0.03kW
18	Xerox Machine	1 nos.	approx 100W each	0.10kW
19	Audio System	4 nos.	approx 50W each	0.20kW
20	Projector.	6 nos.	approx 200W each	1.20kW
	Total Connected load Approx			228.91kW



Chapter – III: STUDY OF ENERGY CONSUMPTION

Bill Month	Units (kVAh)	Billed Demand (kVA)		Bill Amount	per unit
Nov-23	17064 kVAh	112	₹	3,07,550	₹18.02/kWh
Oct-23	31678 kVAh	112	₹	4,98,419	₹15.73/kWh
Sep-23	28437 kVAh	112	₩	4,53,961	₹15.96/kWh
Aug-23	29555 kVAh	112	₩	4,60,343	₹15.58/kWh
Jul-23	27773 kVAh	112	₩	4,36,872	₹15.73/kWh
Jun-23	40881 kVAh	132	₹	6,23,674	₹15.26/kWh
May-23	38792 kVAh	122	₩	5,88,087	₹15.16/kWh
Apr-23	30155 kVAh	118	₩	4,71,253	₹15.63/kWh
Mar-23	26599 kVAh	104	₩	4,18,146	₹15.72/kWh
Feb-23	18001 kVAh	104	₩	3,03,006	₹16.83/kWh
Jan-23	18038 kVAh	104	₹	3,04,111	₹16.86/kWh
Dec-22	19660 kVAh	104	₩	3,25,850	₹16.57/kWh
Total	326633 kVAh		₹	51,91,272	₹15.89/kWh
Minimum	17064 kVAh	104	₩	3,03,006	₹15.16/kWh
Average	27219 kVAh	112	₹	4,32,606	₹15.89/kWh
Maximum	40881 kVAh	132	₹	6,23,674	₹18.02/kWh

Following is the analysis of 12 month's electricity bills

Table 5 Electricity Bill History - Aug-21 to Jul-22







Electricity Consumption	Units (kVAh)	Billed Demand (kVA)		Bill Amount	Cost per unit
Minimum	17064 kVAh	104	₩	3,03,006	₹15.16/kWh
Average	27219 kVAh	112	₹	4,32,606	₹15.89/kWh
Maximum	40881 kVAh	132	₹	6,23,674	₹18.02/kWh

Table 6 Key Observations of Electric Consumption

Dentiouleus		Energy	Source	
Particulars	Electricity (MSEDCL)	LPG(Canteen)	Diesel (Generator)	Total
Average Monthly Consumption	27219 kWh	26 cylinders x 19kg	135 Lites Monthly	-
Annual Consumption	326633 kWh	5928 kg	1620 Litre	-
Oil Equivalent (OE) Conversion	1kg OE = 11.63 kWh	1kg OE = 0.87 kg LPG	1kg OE = 1.12 Litre Diesel	-
Annual Consumption Tons of OE	28.1 TOE	6.8 TOE	1.4 TOE	36.3 TOE
Prevailing Energy Cost (Rate/unit)	₹15.89/kWh	₹1930.00/Cylinder	₹93.00/Litre	-
Annual Energy Cost	₹ 51,91,272	₹ 6,02,160	₹ 1,50,660	₹ 59,44,092
Energy Cost / kg OE	₹185/kg OE	₹88/kg OE	₹104/kg OE	₹164/kg OE
CO2 Factor (kg CO2 / unit)	0.9 kg CO2/kWh	3.2 kg CO2/kg LPG	2.7 kg CO2/Ltr Diesel	-
Carbon Footprint (Tons CO2)	293.97 Tons CO2	18.97 Tons CO2	4.37 Tons CO2	317.31 Tons CO2



Table 7 Energy Mix of the Institute

Chart 4 Annual Energy Cost Breakup







OTHER UTILITIES:

Sewage Treatment Plant	40 m3/day
Solar Water Heater	6500 Ltr/day
Rain Water	65000 saft
Harvesting	05000 sqit
Cummins make	180 KVA Diosol Consumption - 2527 Ltr appual and 211 Ltr monthly consumption
Generator	180 KVA Dieser Consumption - 2527 Etr annuar and 211 Etr montiny consumption
LPG Cylinder Monthly	10 Culinders of 10 Kg nor month
Consumption	40 Cylinders of 19 kg per month
Water Consumption	24,00,000 Ltr per month, 80,000 Ltr. Per day

Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Women Hingna, Nagpur-441118.



CHAPTER-V: STUDY OF USAGE OF ALTERNATE ENERGY SOURCES

• SOLAR WATER HEATER:

- A Solar water heater of 13000 Lit. Per day is installed at the Institute. On an average, a 100Ltr per day solar water heater substitutes around 750kWh of electricity annually (considering electric geyser for water heating). Hence, the installed water heater system has resulted to saving of around 90,000kWh per year.
- STUDY OF RAIN WATER HARVESTING
 - The institute has already implemented the Rain water Harvesting project. The Institute has installed pipes from the terrace and the rain water falling on the terrace is gathered and bore well is recharged using this water. Terrace Area of around 65000 sq.ft. is utilized for the rain water harvesting project.

CHAPTER VI: RECOMMENDATIONS

SOLAR PV PLANT: PROPOSED

- Presently, Solar PV plant is not installed at site. Considering the electrical consumption of around 3.3 Lakh kWh per year, there is scope to install around 250kWp Solar PV plant.
- Feasibility to be checked for installing the Solar PV Plant on rooftop / ground mounted.
- Solar PV plant of 250kWp can offset approx. 90% of the Carbon Footprint of the institute.
- Payback period: around 5 yrs.

• Reduction in Contract Demand:

- Demand charges are calculated as ₹499/kVA. Billed demand (kVA) is calculated as 70% of the Contract Demand (CD) or recorded MD (whichever is higher). It is observed that the Demand Charges have been computed at 70% of CD for 9 months out of last 12 months. The MD has exceeded 70% of CD during the month of Apr, May & Jun 2023.
- It is recommended to reduce the Contract demand to around 140kVA from existing 160kVA. This can lead to cost reduction of around ₹7000 per month (for 9 months).

• Replace exisiting DG Sets with smaller DG sets:

- Presently, DG set of 180kVA is installed. The fuel consumption of the big DG set is very high for small load.
- It is recommended to install 3 small DG sets. Separate for hostel, Engg college & Nursing college. This can lead to reduction in Diesel consumption.



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CHAPTER VII: STANDARD ENERGY SAVING MEASURES

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1. Electrical Systems • Maximise Load Factor • Distribute Load among Transformers optimally • Utilize off-peak hours to balance load • Shift operating time of non-critical equipment to off-peak hours (if possible) • Set Transformer taps to optimum settings • Verify utility metes for accuracy on regular basis • Maintain Earthing Resistance less than 3 Ohms • Use Energy Efficient Transformers. Replace more than 35yr old transformers • Replace old equipment with Energy Efficient ones. Avail subsidies from various govt schemes • Motor performance Is significantly affected when a motor operates at + 10% of the rated Voltage • Unbalanced Voltage / Current can lead to 3-5% losses due to excessive heat. Motor Life is also hampered • Regularly measure motor loads – Voltage, Current, Power Factor, kW, kVA, kVAR • Ensure Proper lubrication in all motors. • Ensure Proper lubrication from motor to driven equipment (wherever feasible) • Replace oversized motors or old motors with those of lower appropriate size and with IE3/IE4 ratings • Maintain PF=unity by installing capacitors directly on the motors. • This will empre endically during maintenance to remove external debris. This will improve pressure and flow • Use pump attenet east Efficiency Point by trimming or changing impeller (if head is higher than necessary) • Use				operate simultaneously
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Ambaselkar Associates LLP Principal Page 13	A ma	Hingna, E		pump emciency
Management and a second and a second a se	LP Principal Page 13			

Hingna, Nagpur-441110.

Report on Energy & Green Audit Maharshi Karve Stree Shikshan Samstha's Educational Campus							
SN	Section	Category	Details				
			Replace Oversized Pumps				
			 If load variation is high, use Variable Frequency Drive 				
			 Use multiple pumps instead of 1 large pump 				
			• Replace standard energy efficiency motor (IE1) with high efficiency motor (IE4)				
			 Adopt parallel pumping for varying flow requirement 				
			• Review & change pipe diameter. 15% increase in pipe diameter				
			can reduce pressure drop by 50%. This allows smaller pump				
			 Reduce Lighting Voltage 				
			 Reduce no of lamps operating and at the same time maintain 				
			lighting levels by using more efficient lamp types				
		Operational /	• Improve maintenance practices. Conduct planned replacement of				
		Housekeeping	lamps. It is less expensive than spot replacement				
			 Measure light levels and adjust to minimum required levels 				
	Lighting		 Use daylighting to the extent possible 				
			Clean lamps & luminaires regularly				
л			 Reduce operating hours – use daylight sensors or time clocks 				
ч.	System		 Replace inefficient lamps with LEDs 				
		Low Cost	 Design & use task lighting 				
			 Lower lamp mounting height 				
			 Consider painting the walls a lighter color 				
		Retrofit	• Consider using Light tubes / solar tubes to bring sunlight in the				
			room				
			• Use Solar lights				
			 Design a separate Lighting distribution panel and install voltage 				
			stabilizer and operate at a lower voltage				

Table 8 Standard Energy Saving Measures

Pranav Ambaselkar **Certified Energy Auditor** Registration: EA-25571, SN: 9157 (Phuleas elly. Certified by Bureau of Energy Efficiency Date

Pranav Ambaselkar

BEE Certified Energy Auditor # EA25571 Ambaselkar Associates LLP 303, Symphony 1, B Wing, First City, MIHAN, Nagpur-441108 Mobile: 9545524203 Email: pranavambaselkar@gmail.com



Dr. Milind Khanapurkar

Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Women Hingna, Nagpur-441110.

Ambaselkar Associates LLP

CHAPTER VIII: PHOTOGRAPHS



Photo 2 Solar Water Heater



Sampling point after ACF





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Photo 3 Sewage Treatment Plan

Ambaselkar Associates LLP

Principal Principal Maharshi Karve Stree Shikshan Sanetha's <u>Cummins College of Engineering for Women</u> Hingna, Nagpur-441110.

Dr. Milind Khanapurkar



Rashtrasant Tukdoji Maharaj Nagpur University

(Government of Central Provinces, State University established by Education Department Notification No. 513 dated August 1, 1923, and governed by the Maharashtra Public University Act, 2016 (Maharashtra Act No. 6 of 2017)

College Development Department

Jamnalal Bajaj Administrative Building, Mahatma Jotiba Phule Educational Campus, Comps Chowk to Ambazari T-Point Marg, Nagpur - 440033 Tel No : 0712-2529932 Fax No: 0712-2555701, E-mail ID: infoarcollege@ymail.com

No.M.V./272

Dated : 15-06-2023

copies,

principal, Cummins College of Engineering for Women Mauja Sukli, Hingana Dist.- Hingana, Dist.- Nagpur - 441110

Subject :- Regarding providing continuous affiliation as per academic and administrative audit of the college.

Sir/Madam,

As per Section 37(j),(k) and 114 of the Maharashtra Public University Act, 2016, regarding the application submitted by you for academic and administrative audit on 03-04-2023 to extend the continuous affiliation period of the ongoing courses in your college, we are hereby informed that, According to the recommendation made by the Academic and Administrative Audit Committee as well as the Board of Trustees, Hon. The Vice-Chancellor has approved under Section 12(7) of the Maharashtra Public University Act, 2016 dated <u>11-06-2023</u>.

On behalf of the Faculty Council Hon. As per the approval given by the Vice-Chancellor, continuous affiliation is being provided to the courses as mentioned in the table below.

A.No.	faculty	Course / Subject / Admission Capacity	year
1	Science and Technology	B. Tech. in Computer Engineering [As Per Syllabus] - [English Medium] - 60 Students,	For the session 2023-24
		 B.Tech. in Electronics and Telecommunication Engineering [As Per Syllabus] - [English Medium] - 60 Students, B.Tech. Mechanical Engineering[As Per Syllabus] - [English Medium] - 60 Students 	



Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Curmins College of Engineering for Women Hingna, Nagpur-441110.

Your faithful,

(Dr. Raman Madane) Deputy Chancellor R.T.M. Nagpur University, Nagpur

03/02/2024, 12:50

Copy forwarded for information :-

1. Hon. Director (Board of Examinations and Evaluation), R.T.U.M. Nagpur University, Nagpur

(Dr. Raman Madane) Deputy Chancellor R.T.M. Nagpur University, Nagpur



Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Worken Hingna, Nagpur-441110.



Rashtrasant Tukdoji Maharaj Nagpur University

(Government of Central Provinces, State University established by Education Department Notification No. 513 dated August 1, 1923, and governed by the Maharashtra Public University Act, 2016 (Maharashtra Act No. 6 of 2017)

College Development Department

Chhatrapati Shivaji Maharaj Administrative Complex, Rabindranath Tagore Marg, Nagpur - 440001 Phone No: 0712-2529932 Fax No: 0712-2555701, E-mail ID: infoarcollege@ymail.com

No.M.V./1552

Date : 02-07-2020

copies,

principal, Cummins College of Engineering for Women Mauja Sukli, Hingana Dist.- Hingana, Dist.- Nagpur - 441110

Subject :- Regarding providing continuous attachment.

Sir/Madam,

As per Section 114 of the Maharashtra Public University Act, 2016, to extend the continuous affiliation of the ongoing courses in your college for the session <u>2020-21</u>, we <u>have d. Regarding the application sent on 28-08-2019</u>, we are informed that as per the recommendation made by the Scrutiny Committee on the report submitted by the Local Inquiry Committee after visiting the college, Mr. Under Section 12(7) of the Maharashtra Public University Act, 2016, the Vice- <u>Chancellor</u> Approved on <u>25-06-2020</u>

<u>•</u>

As per the recommendation approved by the Faculty Council, the following courses are being offered continuous affiliation from the session <u>2020-21</u> to <u>2022-23</u>.

A.No.	faculty	Course / Subject / Admission Capacity	year
1	Science and Technology	B.E. in Computer Engineering [As Per Syllabus]- 60 students, B. e. in	From Session 2020-21 to
		Electronics and Telecommunication Engineering [As Per Syllabus]- 60	2022-23
		students, B.E. Mechanical Engineering [As Per Syllabus]- 60 students	

Your faithful, Your faithful, Your faithful, (Dr. Raman Madane) Deputy Chancellor (Additional Works) R.T.M. Nagpur University, Nagpur

Copy forwarded for information :-

1. Hon. Director (Board of Examinations and Evaluation), R.T.U.M. Nagpur University, Nagpur

(Dr. Raman Madane) Assistant Registrar (M.V.) R.T.M. Nagpur University, Nagpur



Dr. Milind Khanapurkar Principal Maharshi Karve Stree Shikshan Sanetha's Cummins College of Engineering for Worken Hingna, Nagpur-441110.