

**Re: GATE-2022 || ONLINE REGISTRATION || LAST DATE: 28th- SEPT-2021**

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Tue 9/28/2021 8:19 AM

To: 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

Cc: ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

Gentle reminder,!

Today is the last date to fill GATE-2022 application form.

Students who have filled (registered & paid fees) the GATE-2022 form are required to furnish details in the form below.

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUOTUzRFIFROE5REZURjFPTzhTMFNSNIZBTy4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUOTUzRFIFROE5REZURjFPTzhTMFNSNIZBTy4u)

Note: we are planning to conduct GATE-2022 support classes for those students who have filled the GATE form and also furnished the above form.

A detailed plan of GATE Support Classes will be shared later.

Thanks.

Regards,  
SPS

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**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Friday, September 24, 2021 6:55:59 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE-2022 || ONLINE REGISTRATION || LAST DATE: 28th- SEPT-2021

Dear Students,

**Due to technical problems, the Application deadline has been extended upto 28<sup>th</sup> September, 2021 with No Additional Fees**

Registration status so far:

3rd year students: 4

4th year students: 8

Students are advised to fill the GATE-2022 form.

Regards,

SPS

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**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Wednesday, September 22, 2021 8:28:23 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE-2022 || ONLINE REGISTRATION || LAST DATE: 24- SEPT-2021

Gentle reminder!

Last date is approaching & don't forget to fill the form in the trail mail.

Know where we stand:

Total, 9 students (out of 277\*) have filled GATE-2022 form.

\*277 eligible students: 3rd year (83 students) + 4th year (194 students).

Stop beating around the bush:

Students who have not filled the form and are not intended to do so, are required to fill the form below:

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUNFNFUTMxN08xNFFEMTZRSjdUR1hXT1ZTRC4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUNFNFUTMxN08xNFFEMTZRSjdUR1hXT1ZTRC4u)

Are you ready? Technology around the corner:

IoT, Robotics, Automation, Digital Manufacturing, Electric Vehicle, Supply Chain, Additive Manufacturing, Industry 4.0, Drone, Renewable energy and many more.

How can you be ready when opportunity knocks: Higher education > M. Tech or M. S.

Don't limit yourself due to any preconceived notions about GATE.

You may reach out to your seniors:



<https://www.linkedin.com/in/viranjanb>

<https://www.linkedin.com/in/mahindra-rautela-9743a5a5>

<https://www.linkedin.com/in/nikhil-m-8741a1108>

For any query, please write/call me.

Thanks.

Regards,  
SPS

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**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Wednesday, September 15, 2021 9:03:26 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE-2022 || ONLINE REGISTRATION || LAST DATE: 24- SEPT-2021

Gentle reminder!

Last date is approaching & don't forget to fill the form in the trail mail.

Few facts:

Qualifying marks: GATE-2021 (Mechanical Engineering)

- Gen: 33
- Obc: 29.7
- SC/ST/PH: 22

Topper Marks: GATE-2021(Mechanical Engineering)

- 93.22

Number of students appeared in GATE-2021 (Mechanical Engineering Paper)

- 120594

About 17.8% (out of 120594) candidates qualified GATE-2021 (ME).

"The first step is to establish that something is possible, then probability will occur".- Elon Musk

First step: Fill GATE-2022 application form soon.

Regards,

Get Outlook for Android

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**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Friday, September 10, 2021 5:39:10 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE-2022 || ONLINE REGISTRATION || LAST DATE: 24- SEPT-2021

with reference to trail mail, students who filled (registered & paid fees) the GATE-2022 form are required to furnish details in the form below.

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUOTUzRFIFR0E5REZURjFPTzhTMFNSNIZBTy4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUOTUzRFIFR0E5REZURjFPTzhTMFNSNIZBTy4u)

**Why you should opt to prepare and write GATE:**

- **PSU jobs** (under 500 ranks, in recent, one of your senior joined IOCL)
- **Chances to do Masters** (even PhD, many do not know this) in IISc/IITs/NITs (It would be your backup plan, if not interested now)
- **Campus placement success** (Technical subjects' knowledge & aptitude skills after going through rigorous preparation will help you in campus placement too)
- **Helps in writing other exams** say IES (more or less, GATE syllabus has become a standard syllabus now for other engineering jobs; preparation is key)
- **Admission to MBA program** in NITIE Mumbai (check it on the website)
- A high GATE score is a **benchmark for many recruiters/employers** (showcase in your resume)
- **Opportunity to do research** in NPCIL/BARC/DRDO
- **Opportunity to study abroad**
- **Stipend** (Rs. 12,400 to 25,000, even higher in some cases) read this bullet point with bullet number 2.

**Register yourself as early as possible.**

Please feel free to contact the undersigned for any queries.

**All the Best !!**

**Thanks.**



regards,  
**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad  
Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.  
Office: +91 120 7135112 (Ext: 309)|Fax: +91 120 7135115  
W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)

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**From:** Shailendra Pratap Singh  
**Sent:** Thursday, September 9, 2021 5:15 PM  
**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>  
**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>  
**Subject:** GATE-2022 || ONLINE REGISTRATION || LAST DATE: 24- SEPT-2021

Dear GATE Aspirants,

As you all are aware that GATE is a national level examination jointly conducted by IISc Bangalore and 7 IITs. GATE examination is a Computer Based Test and it tests the comprehensive understanding of subjects of the chosen discipline.

**GATE-2022 examination is going to be organized by IIT Kharagpur.**

**Benefits of GATE Scorecard:**

- Mandatory requirement for **seeking admission** and or **financial assistantship** to MTech/PhD program at IITs/IISc.
- There are few **foreign universities** for which GATE is one of the criteria to get **admission** in their **MS and PhD program**.
- GATE score is also used by some **PSUs** (BHEL, GAIL, HAL, IOCL, NTPC, NPCIL, ONGC, PGCIL) for their **recruitment**.
- GATE-2022 scorecard will remain valid for **three years**.

**Eligibility Criteria for GATE-2022:**

- A candidate who is currently studying in the **3rd year or 4th year** can appear for the GATE-2022 examination.
- There is **no age limit** to appear for the GATE-2022 examination.

**Important Dates:**

- **Closing date of REGULAR online registration/application portal- 24th September 2021**
- **End of the extended period for online registration/application - 1st October 2021**

For Examination Centres in India	Regular Period (30 <sup>th</sup> August to 24 <sup>th</sup> Sept. 2021)	During the Extended Period (25 <sup>th</sup> Sep. to 1 <sup>st</sup> Oct. 2021)
Female candidates (per paper)	₹ 750	₹ 1250
SC / ST / PwD* category candidates (per paper)	₹ 750	₹ 1250
All other candidates (per paper)	₹ 1500	₹ 2000

Note: The application fee mentioned above DOES NOT INCLUDE service charges, processing fees and any other charges that the banks may levy.

\*PwD means Persons with Disability.

**Important links:**

**For registration & login**

<https://gate.iitkgp.ac.in/>

**For information brochure**

[https://drive.google.com/file/d/1ku4vlbV7BB-53JCVqQxl\\_WXjBufkPhuz/view](https://drive.google.com/file/d/1ku4vlbV7BB-53JCVqQxl_WXjBufkPhuz/view)

**Register yourself as early as possible.**

Please feel free to contact the undersigned for any queries.

**All the Best !!**

**Thanks.**

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad  
 Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.  
 Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115  
 W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)



## GATE Support Class-1 [Sub: Heat Transfer, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Tue 10/19/2021 10:06 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 2 attachments (188 KB)

Heat Transfer Class\_19-10-2021.pdf; Heat Transfer Class\_19-10-2021.pdf;

Dear Students,

pfa handouts including practice problems based on today's class.

Please provide your valuable suggestions and feedback based on today's class through the link below:

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUQ1IyTUdDOTFUVTJLQTMzSzlIVko4Tk1VOC4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUQ1IyTUdDOTFUVTJLQTMzSzlIVko4Tk1VOC4u)

### **Schedule for tomorrow (20-10-2021):**

**Time:** 4:35 PM onwards (approx. 1 hour)

**Venue:** LT-45, RNB, F-3

**Subject:** Thermodynamics (as per the request of students)

**Topic:** First Law of Thermodynamics

Thanks.

regards,

**Shailendra Pratap Singh**

**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**

**Assistant Professor**

**Department of Mechanical Engineering**

**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in

**GATE Support Classes**  
**Subject: Heat Transfer**  
**Date: 19-10-2021, Time: 04:35 PM to 05:50 PM, Venue: LT-45 RNB, F-3**

**Attendance:**

S.No.	Roll No.	Student Name
1	1900320400008	Ajay Kumar Verma
2	1900320400013	Anuj Sharma
3	1900320400019	Buddhpriya Karuna
4	1900320400055	Sanskar Bhardwaj
5	1900320400020	Chandan
6	1900320400058	Shivam Gupta
7	1900320400076	Vindhyeshwar Pandey
8	1900320400075	Vikrant Pundir
9	1900320400015	Ashutosh Vishwakarma
10	1900320400016	Atul Agrahari

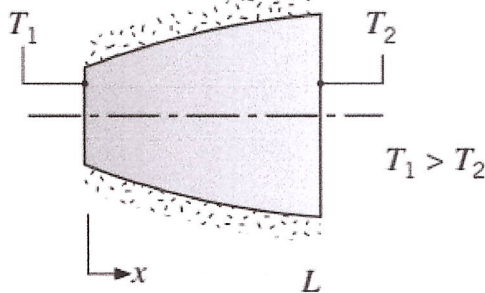
*Sp* Faculty: Shailendra Pratap Singh



**GATE Support Classes**

**Subject: Heat Transfer**

**Date: 19-10-2021, Time: 04:35 PM to 05:50 PM, Venue: LT-45 RNB, F-3**

S.No.	Problem Statement	Answer
1	A freezer compartment consists of a cubical cavity that is 2 m on a side. Assume the bottom to be perfectly insulated. What is the minimum thickness of Styrofoam insulation ( $k = 0.030 \text{ W/m K}$ ) that must be applied to the top and side walls to ensure a heat load of less than 500 W, when the inner and outer surfaces are 10 and 35 °C? Hint: total heat transfer area.	54 mm Do Practice!
2	What is the thickness required of a masonry wall having thermal conductivity 0.75 W/m K if the heat rate is to be 80% of the heat rate through a composite structural wall having a thermal conductivity of 0.25 W/m K and a thickness of 100 mm? Both walls are subjected to the same surface temperature difference.	375 mm Do Practice!
3	The 5-mm-thick bottom of a 200-mm-diameter pan may be made from aluminum ( $k = 240 \text{ W/m K}$ ) or copper ( $k = 390 \text{ W/m K}$ ). When used to boil water, the surface of the bottom exposed to the water is nominally at 110 °C. If heat is transferred from the stove to the pan at a rate of 600 W, what is the temperature of the surface in contact with the stove for each of the two materials?	110.25 °C 110.40 °C Discussed in class.
4	A square silicon chip ( $k = 150 \text{ W/m K}$ ) is of width $w = 5 \text{ mm}$ on a side and of thickness $t = 1 \text{ mm}$ . The chip is mounted in a substrate such that its side and back surfaces are insulated, while the front surface is exposed to a coolant. If 4 W are being dissipated in circuits mounted to the back surface of the chip, what is the steady-state temperature difference between back and front surfaces?	1.066 °C Discussed in class.
5	Assume steady-state, one-dimensional heat conduction through the axisymmetric shape shown below. Assuming constant properties and no internal heat generation, sketch the temperature distribution on $T - x$ coordinates. Briefly explain the shape of your curve. 	Discussed in class- A (x)? & Solution strategy?
6	Fourier's law of heat conduction.	Discussed in class

## Re: GATE-2022 || Registration Status & GATE Support Classes

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Tue 11/9/2021 12:23 PM

To: 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

Cc: ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

Dear Students,

We have started GATE Support Classes before the ST exam and after a long break, it is to be resumed as soon as possible.

I would like to meet all interested students **today** at the department library at **12:50 PM** (during lunch period) to discuss the schedule of GATE Support Classes.

Please be available on time.

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad  
Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.  
Office: +91 120 7135112 (Ext: 309) | Fax: +91 120 7135115  
W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)

---

**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Monday, November 8, 2021 9:51 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE-2022 || Registration Status & GATE Support Classes

Important URL for every GATE Aspirants:

[https://gate.nptel.ac.in/departments.php?c\\_id=1](https://gate.nptel.ac.in/departments.php?c_id=1)

**A good quote to read:**

**"Plough deep while sluggards sleep" - Benjamin Franklin**

**Takeaway:**



Many may say or had said to you that GATE preparation is useless, don't listen to them. I know many students who couldn't clear GATE exams inspite of preparing extremely well but they are now better equipped with **problem solving skill and are fundamentally strong**. For a better perspective, just look around your classmates (present/past) who had prepared for IIT-JEE exam.

Success rate in GATE exam is about 17%, which means many of you will be counted among 17% (17 out of every 100 students) in near future.

**Hard work is key to success.** GATE syllabus is very small subset of University syllabus. **If you work on your fundamentals and problem solving skill in regular classes itself, can crack GATE exam in very first attempt.**

**Note:** Considering the way NPTEL platform is making advancements to provide GATE support, I will not be surprised if AICTE make GATE as an exit exam for engineering graduates in near future.

Please go through the above mentioned link.

Regards,  
SPS

Get [Outlook for Android](#)

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**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Monday, October 11, 2021 10:40:22 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** GATE-2022 | | Registration Status & GATE Support Classes

Dear Students,

I hope your GATE-2022 preparation is going well. You have approximately 110 to 115 days to ace this exam. Many of you would have already finished few subjects and took a good test series to improve accuracy and speed.

A few aspirants have also joined different coaching institutions and others are preparing on their own. The department has planned to provide GATE Support Classes to needy students beyond the regular timetable.

Interested students are required to fill the form below. The detailed schedule will be shared by Wednesday, 13-11-2021.

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUN1BQUFY4Vk9W0EpPNkNNNIhORIJUV002Vi4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUN1BQUFY4Vk9W0EpPNkNNNIhORIJUV002Vi4u)

## GATE-2022 Registration Status:

Only 16 students have shared their details of filling the GATE-2022 form which is quite low, but I expect there would be a few more students who did not share their details with us.

Please find below the list of students who have shared their details with us.

S.No.	ROLL NO.	STUDENT NAME	YEAR	SEC
1	1803240011	AKASH SINGH	4th	A
2	1803240013	AKSHAT MITTAL	4th	A
3	1803240043	DEEPAK SAXENA	4th	A
4	1803240050	DIVYANSH TYAGI	4th	A
5	1819540003	HRISHIKESH SINGH	4th	A
6	1803240063	INDRA KUMAR	4th	B
7	1803240104	PRAVESH TYAGI	4th	B
8	1803240111	RAJAT GUPTA	4th	B
9	1803240138	SHASHWAT PRATAP SINGH	4th	C
10	1803240176	VISHANT CHAUDHARY	4th	C
11	1900320400013	ANUJ SHARMA	3rd	A
12	1900320400016	ATUL AGRAHARI	3rd	A
13	1900320400019	BUDDHPRIYA KARUNA	3rd	A
14	1900320400021	DHRUV TYAGI	3rd	A
15	2000320409012	SHASHANK SINGH (LE-18)	3rd	B
16	1900320400058	SHIVAM GUPTA	3rd	B

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)



**GATE Support Class-2**  
**Subject: Thermodynamics**

Date: 20-10-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3

**Attendance**

S.No.	Roll No.	Student Name
1	1900320400008	Ajay Kumar Verma
2	1900320400013	Anuj Sharma
3	1900320400019	Buddhpriya Karuna
4	1900320400055	Sanskar Bhardwaj
5	2000320409006	Kaushlendra Mishra
6	1900320400058	Shivam Gupta
7	1900320400076	Vindhyeshwar Pandey
8	1900320400075	Vikrant Pundir
9	1900320400015	Ashutosh Vishwakarma
10	1900320400016	Atul Agrahari

Ajay Kr. Verma

Anuj

Buddhpriya karuna

Kaushlendra mishra

Shivam

Vindhyeshwar

Ashutosh

Atul Agrahari

Few more questions based on topic discussed in today's class:

S.No.	Problem Statement	Answer
1	A spring loaded piston-cylinder contains 1.5 kg of air at 27°C and 160 kPa. Air is heated to 627°C in a process in which pressure is varying linearly with volume to the final volume of twice the initial volume. Draw p-V diagram. And find work transfer.	161.44 kJ
2	Air in a rigid tank is at 100 kPa, 27°C with a volume of 0.75 m <sup>3</sup> . The tank is heated to 127°C, state 2. Now one side of the tank acts as a piston, letting the air expand slowly at constant temperature to state 3 with a volume of 1.5 m <sup>3</sup> . Find the pressures at state 2 and 3. Find the total work and total heat transfer.	133.33 kPa, 66.65 kPa 69.31 kJ 131.83 kJ

*Spink*

Faculty:

Shailendra Pratap Singh

GATE Support Class-2

Subject: Thermodynamics

Date: 20-10-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3

S.No.	Problem Statement	Answer
1	Write the process equation considering atmospheric pressure outside: Case (i). System is defined as gas present within piston (not a massless one) in piston-cylinder assembly. Case (ii). Piston is also the part of the system.	Discussed in class.
2	Write the process equation considering atmospheric pressure outside and spring force: Case (i). System is defined as gas present within piston (not a massless one) in piston-cylinder assembly. Case (ii). Piston is also part of the system.	Discussed in class.
3	Effect of heat addition in above problems on work transfer.	Discussed in class.
	Write first law of thermodynamics expression for following cases: Case (i). System is defined as gas present within piston (not a massless one) in piston-cylinder assembly Case (ii) Piston is also the part of the system. Take: Consider atmospheric pressure outside the piston and heat is added to the gas.	Discussed in class.
4	Draw the p-v diagram for- Case (i). Piston outward motion is restricted by spring force only. Case (ii). Piston moves outward but stops later due to stops used.	Discussed in class.
5	A piston-cylinder device contains $0.05 \text{ m}^3$ of a gas initially at 200 kPa. At this state, a linear spring that has a spring constant of 150 kN/m is touching the piston but exerting no force on it. Now heat is transferred to the gas, causing the piston to rise and to compress the spring until the volume inside the cylinder doubles. If the cross-sectional area of the piston is $0.25 \text{ m}^2$ . (i) Determine final pressure inside the cylinder. (ii) Total work done by the gas. (iii) Fraction of this work done against the spring to compress it.	320 kPa, 13 kJ, 3 kJ TBD
6	A piston-cylinder assembly contains a gas: Initial state of the gas: $V_1 = 0.1 \text{ m}^3$ and $p_1 = 400 \text{ kPa}$ A spring force acting on the piston is proportional to the volume. $p_{\text{atm}} = 100 \text{ kPa}$ acting on the spring side of the piston. This gas is heated until the volume becomes $0.5 \text{ m}^3$ . Calculate: Work done against the (i) atmosphere, (ii) spring and (iii) work done by the gas.	40 kJ, 360 kJ, 400 kJ  Do practice!



## GATE Support Class-3 [Sub: Thermodynamics, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Wed 11/10/2021 9:25 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 1 attachments (92 KB)

Thermodynamics Class\_#3\_10-11-2021.pdf;

Dear Students,

pfa handouts used in today's class also contains a few practice problems based on topics discussed.

### Tomorrow's Schedule:

Subject: Thermodynamics

Date: 11-11-2021

Time: 4:35 PM to 5:50 PM

Venue: LT-46, 3rd Floor, Ramanujan Block

Thanks.

regards,

**Shailendra Pratap Singh**

**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**

**Assistant Professor**

**Department of Mechanical Engineering**

**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in

**Re: GATE Support Class-2 [Sub: Thermodynamics, Handouts & Practice Problems]**

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Wed 11/10/2021 4:21 PM

To: 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

Cc: ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

Dear Students,

Today's GATE Support Class Schedule:

Class 3:

Subject: Thermodynamics

Date: 10-Nov-2021

Time: 4:35 PM to 5:50 PM

Venue: LT-45

Thanks.

Regards,  
SPS

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---

**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Thursday, October 21, 2021 5:32:14 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE Support Class-2 [Sub: Thermodynamics, Handouts & Practice Problems]

Today's (21-10-2021) GATE Support Class is cancelled due to the request of students for their preparation for forthcoming STs.

Next class will be planned after STs.

All the best for your sessional exams.

Thanks.

Regards,  
SPS

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---



**From:** Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

**Sent:** Wednesday, October 20, 2021 11:44:13 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** Re: GATE Support Class-2 [Sub: Thermodynamics, Handouts & Practice Problems]

Dear Students,

pfa handouts with a few more practice questions as per today's discussion. And also find attached 140+ questions (beware with suggested answers) for your practice on the FLOT topic.

Please provide your valuable suggestions and feedback based on today's class through the link below:

[https://forms.office.com/Pages/ResponsePage.aspx?id=Dn\\_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUQjZEVDZaVEVHMk9aNkZGVjFCOFJDSkk0VC4u](https://forms.office.com/Pages/ResponsePage.aspx?id=Dn_YOpMfvUGU9ILDfZcciGzWaTC2Kx9OhNMxVuG2AZpUQjZEVDZaVEVHMk9aNkZGVjFCOFJDSkk0VC4u)

**Schedule for tomorrow (21-10-2021):**

**Time:** 4:35 PM onwards (approx. 1 hour)

**Venue:** LT-45, RNB, F-3

**Subject:** Thermodynamics

**Topic:** First Law of Thermodynamics

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in

---

**From:** Shailendra Pratap Singh

**Sent:** Wednesday, October 20, 2021 2:02 PM

**To:** 2018 ME Students (Section A) <2018me.a@abes.ac.in>; 2018 ME Students (Section B) <2018me.b@abes.ac.in>; 2018 ME Students (Section C) <2018me.c@abes.ac.in>; 2019 ME Students (Section A) <2019me.a@abes.ac.in>; 2019 ME Students (Section B) <2019me.b@abes.ac.in>

**Cc:** ME Department <me.dept@abes.ac.in>; ME Faculty <me.faculty@abes.ac.in>; HOD ME <hodme@abes.ac.in>

**Subject:** GATE Support Class-2 [Sub: Thermodynamics, Handouts & Practice Problems]

Dear students,

**GATE Support Class-3**

**Subject: Thermodynamics**

**Date: 10-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-46 RNB, F-3**

**Attendance**

S.No.	Roll No.	Student Name
1	1900320400013	Anuj Sharma
2	1900320400019	Buddhpriya Karuna
3	2000320409012	Shashank Singh (LE-18)
4	1900320400077	Vivek Verma
5	1900320400076	Vindhreshwar Pandey
6	1900320400015	Ashutosh Vishwakarma
7	1900320400016	Atul Agrahari

Anuj

Buddhpriya

Shashank

Vindhreshwar

Ashutosh

Atul Agrahari



Faculty: Shailendra Pratab  
Singh.



**GATE Support Class-3**  
**Subject: Thermodynamics**

**Date: 10-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-46 RNB, F-3**

S.No.	Problem Statement	Answer
1	Discussed first law of thermodynamics for closed system.	Discussed in Class.
2	Work is done on an adiabatic system due to which its velocity changes from 10 m/s to 20 m/s, elevation increases by 20 m and temperature increases by 1 K. The mass of the system is 10 kg. $c_v = 100 \text{ J/(kgK)}$ and gravitational acceleration is $10 \text{ m/s}^2$ . If there is no changes in any other component of the energy of the system, the magnitude of total work done (in kJ) on the system is?	- 4.5 kJ  Discussed in Class.
3	Discussed first law of thermodynamics for flow system.	Discussed in Class.
4	Discussed the derivation of Steady Flow Energy Equation.	Discussed in Class.
5	A steam turbine receives steam steadily at 10 bar with a enthalpy of 3000 kJ/kg and discharges at 1 bar with an enthalpy of 2700 kJ/kg. The work output is 250 kJ/kg. The changes in kinetic and potential energies are negligible. The heat transfer from the turbine casing to the surroundings is equal to?	50 kJ  Discussed in Class.
6	A small steam whistle (perfectly insulated and doing no shaft work) causes a drop of 0.8 kJ/kg in enthalpy of steam from entry to exit. If the kinetic energy of the steam at entry is negligible, the velocity of the steam at exit is?	40 m/s  For practice
7	The inlet and the outlet conditions of steam for an adiabatic steam turbine are as indicated: Inlet: $h_1 = 3200 \text{ kJ/kg}$ , $V_1 = 160 \text{ m/s}$ , $Z_1 = 10 \text{ m}$ , $P_1 = 3 \text{ MPa}$ Outlet: $h_2 = 2600 \text{ kJ/kg}$ , $V_2 = 100 \text{ m/s}$ , $Z_2 = 6 \text{ m}$ , $P_2 = 70 \text{ kPa}$  Calculate power output if the mass flow rate of steam through the turbine is 20 kg/s, the power output of the turbine (in MW).	12.157 MW  For practice

## GATE Support Class-4 [Sub: Thermodynamics, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Thu 11/11/2021 9:12 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>;2020 ME Students Section A <2020me.a@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 1 attachments (103 KB)

Thermodynamics Class\_#4\_11-11-2021.pdf;

Dear Students,

pfa handouts used in today's class also contains a few practice problems based on topics discussed.

### **Tomorrow's Schedule:**

Subject: Thermodynamics

Date: 12-11-2021

Time: 4:35 PM to 5:50 PM

Venue: LT-46/LT-45, 3rd Floor, Ramanujan Block

Thanks.

regards,

**Shailendra Pratap Singh**

**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**

**Assistant Professor**

**Department of Mechanical Engineering**

**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115


W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)



**GATE Support Class-4**  
**Subject: Thermodynamics**  
**Date: 11-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

**Attendance**

S.No.	Roll No.	Student Name	Year	Signature
1	1900320400013	Anuj Sharma	3rd	Anuj
2	1900320400019	Buddhpriya Karuna	3rd	Buddhpriya
3	1900320400075	Vikrant Pundir	3rd	
4	1900320400055	Sanskar Bhardwaj	3rd	
5	1900320400076	Vindhyeshwar Pandey	3rd	Vindhyeshwar
6	1900320400015	Ashutosh Vishwakarma	3rd	Ashutosh
7	1900320400016	Atul Agrahari	3rd	Atul
8	1900320400042	Nitin Singh	3rd	
9	2021B0403001	Dhruv Ajit	2 <sup>nd</sup>	
10	2000320400017	Ashu	2 <sup>nd</sup>	Ashu

 Faculty: Shailendra Pratap Singh

**GATE Support Class-4**

**Subject: Thermodynamics**

**Date: 11-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

S.No.	Problem Statement	Answer
1	A turbine operates under steady flow conditions, receiving steam at the following state: pressure 1.2 MPa, temperature 188°C, enthalpy 2785 kJ/kg, velocity 33.3 m/s and elevation 3 m. The steam leaves the turbine at the following state: pressure 20 kPa, enthalpy 2512 kJ/kg, velocity 100 m/s, and elevation 0 m. Heat is lost to the surroundings at the rate of 0.29 kJ/s. If the rate of steam flow through the turbine is 0.42 kg/s, what is the power output of the turbine in kW?	112.51 kW Discussed in class.
2	A blower handles 1 kg/s of air at 20°C and consumes a power of 15 kW. The inlet and outlet velocities of air are 100 m/s and 150 m/s respectively. Find the exit air temperature, assuming adiabatic conditions. Take cp of air as 1.005 kJ/kg-K.	28.38°C Discussed in class.
3	Discussed mass conservation equation for transient flow process.	
4	Discussed first law of thermodynamics for transient flow process.	
5	A nozzle is a device for increasing the velocity of a steadily flowing stream. At the inlet to a certain nozzle, the enthalpy of the fluid passing is 3000 kJ/kg and the velocity is 60 m/s. At the discharge end, the enthalpy is 2762 kJ/kg. The nozzle is horizontal and there is negligible heat loss from it. (a) Find the velocity at exit from the nozzle. (b) If the inlet area is 0.1 m <sup>2</sup> and the specific volume at inlet is 0.187 m <sup>3</sup> /kg, find the mass flow rate. (c) If the specific volume at the nozzle exit is 0.498 m <sup>3</sup> /kg, find the exit area of the nozzle.	692.5 m/s 32.08 kg/s 0.023 m <sup>2</sup> For practice.
6	Steam flows through a nozzle at mass flow rate of 0.1 kg/s with a heat loss of 5 kW. The enthalpies at inlet and exit are 2500 kJ/kg and 2350 kJ/kg respectively. Assuming negligible velocity at inlet, the velocity of steam (in m/s) at the nozzle exit is?  GATE 2018: 2 Marks	447.213 m/s For practice.
7	A calorically perfect gas (specific heat at constant pressure 1000 J/kgK) enters and leaves a gas turbine with the same velocity. The temperature of the gas at turbine entry and exit are 1100 K and 400 K, respectively. The power produced is 4.6 MW and heat escapes at the rate of 300 kJ/s through the turbine casing. The mass flow rate of the gas (in kg/s) through the turbine is?  GATE 2017: 2 Marks	7 kg/s For practice.
8	Steam at an initial enthalpy of 100 kJ/kg and the inlet velocity of 100 m/s, enters an insulated horizontal nozzle. It leaves the nozzle at 200 m/s. The exit enthalpy (in kJ/kg) is?  GATE 2016: 2 Marks	85 kJ/kg For practice.
9	Steam enters a turbine at 30 bar, 300°C (u = 2750 kJ/kg, h = 2993 kJ/kg) and exits the turbine as saturated liquid at 15 kPa (u = 225 kJ/kg, h = 226 kJ/kg). Heat loss to the surrounding is 50 kJ/kg of steam flowing through	2717 kJ/kg



**GATE Support Class-4**  
**Subject: Thermodynamics**

**Date: 11-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

	the turbine. Neglecting changes in kinetic energy and potential energy, the work output of the turbine (in kJ/kg of steam) is?	For practice.
	GATE 2015: 2 Marks	
10	Air enters an adiabatic nozzle at 300 kPa, 500 K with a velocity of 10 m/s. It leaves the nozzle at 100 kPa with a velocity of 180 m/s. The inlet area is 80 cm <sup>2</sup> . The specific heat of air $c_p$ is 1008 J/kgK  a) The exit temperature of the air is? b) The exit area of the nozzle in cm <sup>2</sup> ?	484 K, 12.90 cm <sup>2</sup>  For practice.
	GATE 2012: 2 + 2 Marks	

## GATE Support Class-5 [Sub: Thermodynamics, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Fri 11/12/2021 10:03 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>;2020 ME Students Section A <2020me.a@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 1 attachments (97 KB)

Thermodynamics Class\_#5\_12-11-2021.pdf;

Dear Students,

pfa handouts used in today's class also contains a few practice problems based on topics discussed.

### **Schedule for tomorrow (13-11-2021):**

**Subject:** Thermodynamics

**Venue:** Online (MS Team link will be shared)

**Time:** 03:00 PM to 04:00 PM

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)|Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in



**GATE Support Class-5**  
**Subject: Thermodynamics**

**Date: 12-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

**Attendance**

S.No.	Roll No.	Student Name	Year	Signature
1	1900320400013	Anuj Sharma	3rd	Anuj
2	1900320400019	Buddhpriya Karuna	3rd	Buddhpriya
3	1900320400075	Vikrant Pundir	3rd	
4	2000320409006	Kaushlendra Mishra	3rd	Kaushlendra Mishra
5	1900320400076	Vindhyeshwar Pandey	3rd	Vindhyeshwar
6	1900320400015	Ashutosh Vishwakarma	3rd	Ashutosh
7	1900320400016	Atul Agrahari	3rd	Atul
8	2000320409008	Mithilesh Kumar Gupta	3rd	Mithilesh
9	2000320409011	Shailendra Yadav	3rd	shailendra.

*SPS*

Faculty: Shailendra Pratap Singh

**GATE Support Class-5**  
**Subject: Thermodynamics**

**Date: 12-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

S.No.	Problem Statement	Answer
1	Discussed first law of thermodynamics for transient uniform flow process.	
2	Discussed & derived relations for mass conservation equation and energy equation for filling or emptying of a rigid tank or vessel.	
3	An insulated rigid tank having 5 kg of air at 3 atm and 30°C is connected to an air supply line at 8 atm and 50°C through a valve. The valve is now slowly opened to allow the air from the supply line to flow into the tank until the tank pressure reaches 8 atm and then the valve is closed. Determine final temperature of the air in the tank. Take, $R = 0.287 \text{ kJ/kgK}$ , $c_p = 1.005 \text{ kJ/kgK}$ , $c_v = 0.718 \text{ kJ/kgK}$	381.86 K  Discussed in class.
4	A rigid insulated tank is initially evacuated. It is connected through a valve to a supply line that carries air at a constant pressure and temperature of 250 kPa and 400 K respectively. Now the valve is opened and air is allowed to flow into the tank until the pressure inside the tank reaches to 250 kPa at which point the valve is closed. Assume that the air behaves as a perfect gas with constant properties ( $c_p = 1.005 \text{ kJ/kgK}$ , $c_v = 0.718 \text{ kJ/kgK}$ , $R = 0.287 \text{ kJ/kgK}$ ). Final temperature of the air inside the tank is (in K)?  GATE 2021: 1 Mark	559.9 K  For practice.
5	A rigid, insulated tank is initially evacuated. The tank is connected with a supply line through which air (assumed to be ideal gas with constant specific heats) passes at 1 MPa, 350°C. A valve connected with supply line is opened and the tank is charged with air until the final pressure inside the tank reaches 1 MPa. The final temperature inside the tank a) is greater than 350°C b) is less than 350°C c) is equal to 350°C d) may be greater than, less than, or equal to 350°C, depending on the volume of the tank. GATE 2008: 2 Marks	a)  For practice.
6	A rigid, insulated tank that is initially evacuated is connected through a valve to a supply line that carries helium at 200 kPa and 120°C. Now the valve is opened, and helium is allowed to flow into the tank until the pressure reaches 200 kPa, at which point the valve is closed. Determine the flow work of the helium in the supply line and the final temperature of the helium in the tank. Take, $R = 2.0769 \text{ kJ/kgK}$ , $c_p = 5.1926 \text{ kJ/kgK}$ , $c_v = 3.1156 \text{ kJ/kgK}$	816 kJ/kg, 655 K  For practice.
7	A 2-m <sup>3</sup> rigid tank initially contains air at 100 kPa and 22°C. The tank is connected to a supply line through a valve. Air is flowing in the supply line at 600 kPa and 22°C. The valve is opened, and air is allowed to enter the tank until the pressure in the tank reaches the line pressure, at which point the valve is closed. A thermometer placed in the tank indicates that the air temperature at the final state is 77°C. Determine (a) the mass of air that has entered the tank and (b) the amount of heat transfer. Take, $R = 0.287 \text{ kJ/kgK}$ , $c_p = 1.005 \text{ kJ/kgK}$ , $c_v = 0.718 \text{ kJ/kgK}$	9.58 kg, 339 kJ  For practice.



## GATE Support Class-5

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Mon 11/15/2021 10:12 AM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>;2020 ME Students Section A <2020me.a@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

Dear Students,

Today's Schedule for GATE Support Class is as follows:

**Subject:** Thermodynamics

**Topic:** Second Law of Thermodynamics

**Time:** 4:35 PM to 5:50 PM

**Venue:** LT-45

I am planning to conduct a Mock Test on the First Law of Thermodynamics by the end of this week. A detailed plan and schedule will be shared soon.

The topper of this test will be awarded Rs. 1000/- cash prize as a token of appreciation and motivation to strive better.

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in

## GATE Support Class-6 [Sub: Thermodynamics, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Mon 11/15/2021 8:32 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>;2020 ME Students Section A <2020me.a@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 1 attachments (96 KB)

Thermodynamics Class\_#6\_15-11-2021.pdf;

Dear Students,

pfa handouts used in today's class also contains a few practice problems based on topics discussed.

**Schedule for tomorrow (16-11-2021):**

**Subject:** Thermodynamics

**Topic:** 2nd law of thermodynamics

**Venue:** LT-45

**Time:** 04:35 PM to 05:50 PM

Thanks.

regards,

**Shailendra Pratap Singh**

**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**

**Assistant Professor**

**Department of Mechanical Engineering**

**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)|Fax: +91 120 7135115

W: <http://abes.ac.in>, E: [info@abes.ac.in](mailto:info@abes.ac.in)



**GATE Support Class-6**  
**Subject: Thermodynamics**

**Date: 15-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

**Attendance**

S.No.	Roll No.	Student Name	Year	Signature
1	1900320400019	Buddhpriya Karuna	3rd	Buddhpriya
2	1900320400075	Vikrant Pundir	3rd	
3	1900320400076	Vindhyeshwar Pandey	3rd	Vindhyeshwar
4	1900320400015	Ashutosh Vishwakarma	3rd	Ashutosh
5	1900320400016	Atul Agrahari	3rd	Atul
6	2000320409008	Mithilesh Kumar Gupta	3rd	Mithilesh
7	2000320409011	Shailendra Yadav	3rd	Shailendra
8	2000320400022	Deepak Kumar Yadav	2nd	



Faculty: Shailendra Pratap Singh.

**GATE Support Class-6**  
**Subject: Thermodynamics**

**Date: 15-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-45 RNB, F-3**

S.No.	Problem Statement	Answer
1	Discussed thermal energy reservoir, source and sink.	
2	Discussed heat engine and formulation of efficiency of heat engine.	
3	Discussed Kelvin-Planck statement of 2 <sup>nd</sup> law of thermodynamics.	
4	Discussed thermodynamic temperature scale.	
5	Discussed thermal efficiency for reversible and irreversible heat engine.	
6	Discussed Carnot theorem -I and its two corollaries.	
7	A heat engine operates between a source at 600°C and a sink at 20°C. Determine the least rate of heat rejection per kW net output of the engine.	0.5 kW  Discussed in Class.
8	A solar energy based heat engine which receives 80 kJ of heat at 100°C and rejects 70 kJ of heat to the ambient at 30°C is to be designed. The thermal efficiency of the heat engine is? a) 70% b) 18.8% c) 12.5% d) indeterminate  GATE 1996: 2 marks	12.5%  For practice.  Which formula to use and why?
9	A cycle heat engine does 50 kJ of work per cycle. If the efficiency of the heat engine is 75%. The heat rejected per cycle is?  GATE 2001: 2 Marks	16.67 kJ  For practice.
10	A Carnot cycle is having an efficiency of 0.75. If the temperature of the high temperature reservoir is 727°C. What is the temperature of low temperature reservoir?  GATE 2001: 2 marks	-23°C  For practice.



## GATE Support Class-7 [Sub: Thermodynamics, Handouts & Practice Problems]

Shailendra Pratap Singh <shailendrapratap.singh@abes.ac.in>

Wed 11/17/2021 11:43 PM

To:2018 ME Students (Section A) <2018me.a@abes.ac.in>;2018 ME Students (Section B) <2018me.b@abes.ac.in>;2018 ME Students (Section C) <2018me.c@abes.ac.in>;2019 ME Students (Section A) <2019me.a@abes.ac.in>;2019 ME Students (Section B) <2019me.b@abes.ac.in>;2020 ME Students Section A <2020me.a@abes.ac.in>

Cc:ME Department <me.dept@abes.ac.in>;ME Faculty <me.faculty@abes.ac.in>;HOD ME <hodme@abes.ac.in>

📎 1 attachments (125 KB)

Thermodynamics Class\_#7\_17-11-2021.pdf;

Dear Students,

pfa the handout used in today's class also contains a few practice problems based on topics discussed.

Thanks.

regards,

**Shailendra Pratap Singh**  
**M.Tech (Fluid & Thermal Sciences) IIT Kanpur**  
**Assistant Professor**  
**Department of Mechanical Engineering**  
**Mobile Number (+91 9910577989)**

ABES Engineering College, Ghaziabad

Campus 1, 19<sup>th</sup> KM Stone, NH 24, Ghaziabad -201 009, U.P.

Office: +91 120 7135112 (Ext: 309)| Fax: +91 120 7135115

W: <http://abes.ac.in>, E: info@abes.ac.in

**GATE Support Class-7**  
**Subject: Thermodynamics**

**Date: 17-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-47 RNB, F-3**

**Attendance**

S.No.	Roll No.	Student Name	Year	Signature
1	1900320400019	Buddhpriya Karuna	3rd	Buddhpriya
2	1900320400075	Vikrant Pundir	3rd	
3	1900320400076	Vindhreshwar Pandey	3rd	Vindhes
4	1900320400015	Ashutosh Vishwakarma	3rd	Ashutosh
5	2000320409008	Mithilesh Kumar Gupta	3rd	Mithilesh

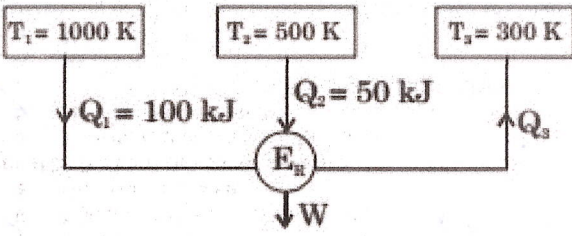
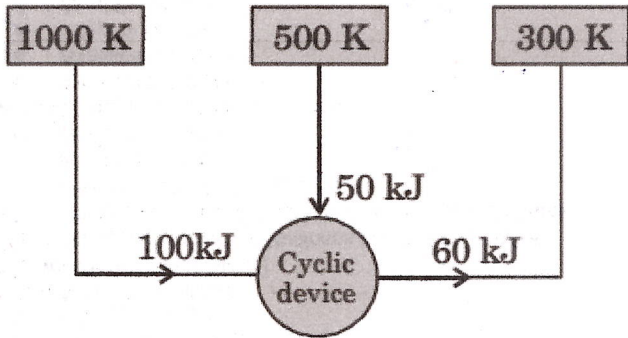
*[Handwritten signature]*

Faculty: Shailendra Pratap Singh.



**GATE Support Class-7**  
**Subject: Thermodynamics**

**Date: 17-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-47 RNB, F-3**

S.No.	Problem Statement	Answer
1	Discussed following topics: i. Carnot theorem -2. ii. Working and performance analysis of refrigerator and heat pump. iii. Clausius statement of 2 <sup>nd</sup> law of thermodynamics. iv. Coefficient of performance of Carnot refrigerator and heat pump. v. Clausius Inequality.	
2	Temperature of a room is being maintained at 25°C by a heat pump. The room loses heat at the rate of 1.5 kJ/s when the outside temperature is 0°C. Under the given conditions if the COP of the heat pump is 2.22. Determine the power input to the heat pump.	0.676 kJ/s Discussed in class.
3	Figure below shows a reversible heat engine $E_R$ having heat interactions with three constant temperature systems. Calculate the thermal efficiency of the heat engine.    GATE 1993: 2 Marks	60% Discussed in class.
4	A cyclic device operates between three thermal reservoirs as shown in the figure. Heat is transferred to/from the cycle device. It is assumed that heat transfer between each thermal reservoir and the cyclic device takes place across negligible temperature difference. Interactions between the cyclic device and the respective thermal reservoirs that are shown in the figure are all in the form of heat transfer.    The cyclic device can be a) A reversible heat engine b) A reversible heat pump or a reversible refrigerator	a) Why?

**GATE Support Class-7**

**Subject: Thermodynamics**

**Date: 17-11-2021, Time: 04:35 PM to 5:50 PM, Venue: LT-47 RNB, F-3**

	c) An irreversible heat engine d) An irreversible heat pump or an irreversible refrigerator	
5	An irreversible heat engine extracts heat from a high temperature source at a rate of 100 kW and rejects heat to sink at a rate of 50 kW. The entire work output of the heat engine is used to drive a reversible heat pump operating between a set of independent isothermal heat reservoirs at 17°C and 75°C. The rate (in kW) at which the heat pump delivers heat to its high temperature sink is? a) 50 b) 250 c) 300 d) 360  GATE 2009: 2 Marks	300  For practice.
6	The heat removal rate from a refrigerated space and the power input to the compressor are 7.2 kW and 1.8 kW, respectively. The coefficient of performance (COP) of the refrigerator is?  GATE 2016: 1 Mark	4  For practice.
7	A reversible cycle receives 40 kJ of heat from one heat source at a temperature of 127°C and 37 kJ from another heat source at 97°C. The heat rejected (in kJ) to the heat sink at 47°C is?  GATE 2016: 2 Marks	64 kJ  For practice.
8	A heat pump absorbs 10 kW of heat from outside environment at 250 K while absorbing 15 kW of work. It delivers the heat to a room that must be kept warm at 300 K. The COP of the heat pump is?  GATE 2017: 1 Mark	1.67  For practice.