Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

Re-Examination

December 2019

Max. Marks: 100

Class: C/M/E

Semester: II

Duration: 3 Hours

Program: FY B. Tech

Name of the Course: Communication Skills

Course Code: HSM BT107

Instructions:

1. **Question No 1 is compulsory.**
2. Attempt any five questions out of Seven
3. Draw neat diagrams.
4. Answers to all the sub questions should be attempted and grouped together.
5. Students are requested to follow all the instruction.

Q. NO		points	CO	BL	PI
Q1 (a)	Explain the process of communication and point out the various barriers to effective communication. Also suggest ways and means to ensure an effective communication.	12	01	02	10.4.1
(b)	Attempt any TWO of the following in about 200 Words each: 1. Explain the eye contact in interpersonal communication. 2. Enumerate the any two guiding principles for effective letter writing 3. Explain and suggest guidelines for effective Reading	08	01,02,03,04,05	04	10.4.2
Q2 (a)	Write a letter form Gokul and Brothers Printers, 2 Samant cross road, Malad, Mumbai giving quotation for printing of two thousand copies of your college answer books of two 40 pages, specifying the quality of paper, paper size, printing charges, printing of black and white and cover paper etc. (use semi block form) Invent necessary details.	12	04	05	10.4.2
(b)	Downward channel of communication is very useful for the smooth functionaing of the organization. Suggest limitations of Downward communications and methods to make the communication effective.	08	01	02	12.6.2
Q3 (a)	You have received from your suppliers some paper in a damaged condition. Write to them a letter of complaint emphasizing the need of greater care in filling the orders and replacement of the damaged goods. (use complete Block form) Invent necessary details	12	04	06	10.4.2
(b)	What points should be kept in mind for effective public speaking skills? Elaborate your answer with the Talk Power Program.	08	02	04	9.5.1
Q4 (a)	You wish to purchase computers for establishing a lab in your institute. As head of your department Write to HP Priority dealer enquiring for 100 computers that you wish to purchase. Give detailed specifications of the desktops that you need. (use modified Bloch form). Invent necessary details	12	05	06	9.5.2

(b)	Explain the Importance of non-verbal communication. List the aspects of Non-verbal communication and briefly explain.	08	01	04	10.5.2
Q5 (a)	What are the reasons for language barriers to communication in human minds? Explain any four reasons in detail.	12	03	05	9.5.1
(b)	Explain the barriers to effective reading skills. Elaborate the techniques to improve Reading.	08	03	05	9.5.1
Q6 (a)	If popularity of the benchmark of capacity, the 'dirty 'fuel is now measuring up to it. Diesel had been a loser for long, trying to catch up with gasoline in term of efficiency and performance. It was much maligned by rattling technology and noisy operations. Now, after decades, diesel cars have taken over the Indian market leaving petrol – fired far behind. For the first half of 2010, the Indian auto mart witness a spurt in the sales of diesel propelled cars , so that in India's premium car segment – from Maruti Swift to the BMW7 series category -59 per cent of the 6.88 lakh units sold in the first half of 2010 were diesel powered. Percentages are even higher than Europe, where the market is evenly divided between both the fuels. Auto companies in India attribute this change to technology advancements that have given diesel higher fuel efficiency and better pick-up. Historically the sales of diesel –driven cars had plummeted due to high maintain costs and premium pricing. The gradual change has now become a major determining factor for the success and failure of new cars. 'The verdict is clearly in favor of diesel driven cars, says Mercedes Benz MD and CEO, Wilfred Aulbur. He further said,' customers are very pleasantly surprised by the clears advantage of instant acceleration and higher torque offered by modern diesel engines, even as petrol is trying to catch up on the technological changes '. For Merc.the country's most acclaimed luxe marque, diesel dominates its portfolio of E class, its largest selling models. For the Indian with deep pockets it is the luxury car segment running on diesel that is most popular. Consider this: of the 446 cars in the BMW7 series, Audi A8and model sold in the first six months of 2010, 79 per cent hand diesel engines. "There has been a strong inclination toward diesel in the past few years, 'says Toyota Kirloskar Deputy managing Director (Marketing) Sandeep Singh. Indian customers prefer cheaper diesel model which provide better acceleration and return on investment. The times are not far away when will be the strongest portfolio across all segments.' The diesel Fortuner, launched last year, has ended the domination of competitive model like the erstwhile segment leaders, Honda's CRV and Mitsubishi Outlander that are only available in petrol versions. The performance for the diesel particularly noticeable in premium cars priced above Rs lakhs and luxury sedans and SUVs in the Rs crore brackets. The affinity for diesel also follows the introduction of the much-acclaimed common rail diesel injection (CRDI) technology that was first launched in by Hyundai in its Ascent sedan. Sharp injectors- based fuel technology allowed diesel to burn much faster with learner operation, leading to higher fuel efficiency and faster acceleration. Over the years, several modifications in diesel technology have been taken up by auto companies. Even entry –level cars made by Indian companies like Mahindra's Scorpio and Tata Motor's Indica now come loaded with modern diesel engines based on the CRDI technology, which was once domain of high – prices cars.	12	02	02	8.3.1

	Answer the following question by the choosing the right option 1) The author in this passage attempts to establish which of the following? (a) The diesel cars these days are not only attractive but also costly. (b) Modern day diesel cars are likely to become a dominating force in the Indian market. (c) Indians are pleasantly surprised by the clears advantage of having a diesel car. 2) With which of the following is the author most likely to disagree? (a) Though diesel cars are becoming attractive, they are not as efficient as petrol cars. (b) Indian customers prefer diesel model which provide better acceleration. (c) Now diesel cars are more popular than petrol cars in India. (d) The companies that produce only version are losing their dominating in the market. (3). In the author's view, the preference for diesel cars in the Indian auto market is due to which of the following? (a) Recession has made Indian customers wary of expensive petrol –driven cars. (b) Technological advancements have helped diesel cars become more efficient and economical (c) Diesel cars have rich dividends to offer to the customers. (d) Today, the numbers of diesel cars produced far exceeds the numbers of petrol cars produced. (4) The phrase 'Indian with deep pockets …'suggest which of the following: (a) Indian who are rich. (b) Indian who is more inclined toward buying petrol cars. (c) Indian who are more inclined towards buying diesel cars. (d) Indian who prefer utility to luxury while purchasing a car. 5. The above passage is written in which of the following style? (a)Narrative (b) Analytical (c) Descriptive (d) information 6. Write a summary of the passage in 150 words.				
Q.6. (b)	Read the sentences give below and choose the word that fits the context from among the given homophones/homonyms: 1. The **imminent/eminent** scholar died of cancer. 2. We don't see it as a **fair/fare** deal. 3. It is difficult to **elicit/illicit** an honest reply from a crafty man. 4. Those days, slaves were denied even a **drought/draught** of water. 5. A floral tribute was offered to the **diseased/deceased** leader. 6. James received rich **complements/compliments** for his recitation.	08	02	04	12.5.2

	7. The report gives detailed and **comprehensive/comprehensible** suggestions. 8. The little girl had a **loveable/lovely** face.				
Q.7. (a)	Case Study: A new project was on the way for NMC textiles, and its chief executive officer (CEO) , Dinesh Ravi, assigned two of his senior managers to the project. One of the managers, with eight years of experience, had just joined back- office from maternity leave and the other manager had been working with the company for over a decade. The new assignment involved holding a workshop with the clients over a week in order to understand their grievances and also changes the clients would like to see implemented in the future. Although the overall relationship between the NMC and its clients was 'about fine' as per some in-house surveys, the latter had serious dissatisfaction over some important issues. Communication was identified as a major bottleneck, and some technical issues came out as a result of the survey. Ravi was worried, as he wanted to build a long-lasting relationship with the clients. He therefore felt that there was a need to connect with the clients, understand the key issues, and address these issues at the earliest. The two managers had formed a small team to assist them in organizing and conducting the workshop. The team was also expected to extend any miscellaneous support that the managers may require. The CEO expected the client meeting to be complete in a couple of months. However, even though the dates of the workshop were fast-approaching, there was not enough progress in the preparation. Each time the CEO checked with managers, they said that the preparations were going on 'fine' and they had the necessary synergy to take up the assignment efficiently, despite the fact that there was no clear division of tasks and responsibilities between them. Ravi somehow reposed blind faith in his managers; he was confident that since they had been working in the company for a long time, they would manage the task well. The CEO did share some of his suggestions and expected his managers to discuss them with their team. The managers did not take the client workshop too seriously. They were focusing on their other priorities. They assumed that the workshop could be organized with very little effort by them and did not consider it important to pass on the CEO's suggestions to the team. In fact, there were hardly any serious discussions between the managers and their team. The team was aware of the poor coordination by the managers and was worried, as a mediocre performance would harm the image of the team in general and that of the team members in particular. The team waited and finally, two days before the workshop, the agenda for the workshop, prepared by the managers on their own without any discussion, came to them. The team realized that the matters could deteriorate, as the agenda laid out by both the managers was vague and the details regarding the core issues of discussion at the workshop were not given clearly. Besides focusing on their other priorities, the manager who was back from maternity leave was planning an extended holiday for another year (which the company policies allowed) and felt her involvement would not matter much. Her colleague, on the other hand, did not give much importance to discussions and preferred one-way communication from top to bottom.	12	05	06	12.4.2

	This attitude can be understood by looking back at the functioning of this manager's department, which was quite laidback in its approach. Panicking at the last moment was a norm. The intra-departmental communication was rigid and hierarchical, and the approach towards work 'slow and meandering'. Things were not allowed to 'jump ranks'. So, everyone with this team had to mould themselves to fit this style of working. Hiding information or not taking action on it was considered a source of 'individual power'. Through their lackadaisical approach to organizing the workshop, the managers were only living up to their reputation. Despite being aware of the poor state of affairs, the individual members of the team could not take up the issue with the CEO directly. There were some discussions among the managers and the team members over phone and emails. However, the communication was virtually still one-way. There was hardly any face-to-face discussions where plans and ideas could be sorted out clearly, although all the members were located in the same building. One day, all of a sudden, the managers asked their team to arrange for the client meeting within three days at their head office. The clients were sent a request to attend the meeting, but most of them, particularly those who lived in other states, politely turned it down. They wondered how the company had assumed that all the clients would be able to attend the meeting at such short notice. They, in turn, had a brief discussion among themselves and proposed that the workshop be held in a couple of weeks. The managers could not postpone the workshop for that long as they had to report to the CEO within a week. The team was caught between the managers and the clients, trying to find a suitable solution to their respective demands. The managers conveyed their inability to be flexible and finalized the earlier date that they had proposed; whoever could not attend the meeting in person was requested to be present via videoconferencing. On the day of the meeting, very few clients turned up. Some tried to participate using videoconferencing with a bad connectivity, but most of the clients from smaller cities had not even heard of the technology. Questions: *1.* Identify the problems in the above case study related to all the components of a communication process. (***List every element of the communication Process and identify the problems with each element.)*** 2. List how you as a good communicator would make this situation effective. Describe the steps that you will take to improve the communication.				
Q.7. (b)	**Choose the correct answer from the choices given:** 1. Communication is the act of …….. a) Transmitting and receiving information. b) Receiving information. c) Transmitting information. d) None of them 2. There is a paradox in communicating because …….. a) I cannot expect that you will understand everything I tell you. b) I cannot expect that you will understand only what I tell you. c) Both (a & b). d) We can't understand each other.	08	04	02	10.4.1

3. Communication is ……
a) Continuous.
b) Complicated.
c) Contextual.
d) All of the above.

4. Communication is affected by …….. Context.
a) Psychological
b) Environmental
c) Cultural
d) All of the above

5. Communication is the process of ……..
a) Creating shared understanding.
b) Speaking & listening.
c) Understanding the opponent ideas.
d) Making yourself clear.

6. The first and most important reason for communicating is ……
a) To build relationships with other people.
b) To deliver a message.
c) To understand the opponent ideas.
d) To create shared understanding.

7. Semantic barriers to communication refers to
a) Jargon
b) Multiple meanings
c) Connotations and Denotations
d) All the above.

8. The science of studying non-verbal communication is known as
a) proxemics
b) Kinesics
c) Occulesics
d) Haptics

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Examination for F.Y.B Tech (Civil/Mechanical/Electrical)

PREVIOUS SEMESTER, Even Semester

New Course

Total Marks: **100** Duration: **3 Hrs**

CLASS/SEM : **F.Y.B Tech (C/M/E) Sem.-II** COURSE NAME : **APPLIED PHYSICS-II**

COURSE CODE: **BSBT205**

- **Question No 1 is compulsory.**
- **Answer any FIVE out of SEVEN questions.**
- **Diagrams have to be drawn wherever necessary.**
- **Assume suitable data (if necessary) and state your assumptions clearly.**

Good luck!

		Mark	Module	CO	BL	PI
Q1.						
a.	Deduce Gauss' law in integral form from its differential form.	8	1	1	1	1.2.1 1.1.1
b.	Derive an expression for resolving power of a diffraction grating. Calculate the minimum number of lines in a grating which will just resolve in the first order the lines whose wavelengths are 5048A° and 5016 A°.	8	4	1	1	1.2.1 1.1.1
c.	When current flows down a wire, work is done, which shows up as Joule heating of the wire. Using Poynting's theorem, find the energy per unit time delivered to the wire assuming the electric field to be uniform.	4	3	1	2	1.2.1
Q2.						
a.	Derive line, area and volume elements for spherical polar coordinate system.	8	1	1,2	2	1.1.1 1.2.1
b.	Derive an expression for path difference between reflected rays in thin films of uniform thickness. White light is incident on a soap film at an angle $\sin^{-1}(4/5)$ and the reflected light is observed using a spectroscope. It is found that consecutive dark bands correspond to wavelengths 6.1×10^{-7}m and 6.0×10^{-7}m. If the refractive index of the film is 4/3, calculate its thickness.	8	4	3	2	1.2.1
c.	A He-Ne laser operates with a current of 10mA at a DC voltage of 2500V and gives an optical output of 5mW. Calculate its efficiency.	4	5	4	3	2.1.3
Q3.						
a.	Define magnetic vector potential and hence derive an expression for the same. Explain the differences between scalar potential in electrostatics with vector potential.	8	2	1,2	1,3	1.1.1 1.2.1
b.	State and explain Poynting theorem. Calculate the work done in the power transmission with E and H given by 50 and 65 respectively. The velocity of propagation is 20m/s.	8	3	2	4	1.2.1 2.1.3
c.	A plane transmission grating produces an angular separation of 0.01radian between two wavelengths observed at an angle 30°. Given mean value of the wavelength as 5000A°, calculate the difference in	4	4	3	3	1.2.1

	two wavelengths if the spectrum is observed in the second order.					
Q4.						
a.	Derive electromagnetic wave equations in vacuum from Maxwell's equations and hence trace the electric and magnetic fields assuming they are polarized along X-direction (OR propagating along Z-direction).	8	3	2	2	1.2.1
b.	Write a note on construction and working of NdYAG laser.	8	5	4	2	1.2.1
c.	Find the electric field at a distance z above the midpoint of a straight line segment of length 2L, which carries a uniform charge density λ. Reduce it to the form if we want to find for an infinite straight wire.	4	1	1	1	1.1.1 1.2.1
Q5.						
a.	State the intensity distribution expression when light gets diffracted through a double slit and hence explain the conditions for maxima, minima and secondary maxima.	8	4	3	1,2	1.2.1
b.	Calculate the potential inside and outside a spherical shell of radius R which carries a uniform surface charge. Set the reference point at infinity.	8	1	1	3	1.1.1 2.1.3
c.	Calculate the angular spread of a laser beam of wavelength 6930A° due to diffraction, if the beam emerges through a 3mm diameter mirror. How large would be the diameter of this beam when it is incident on a satellite 300km above earth?	4	5	4	3	1.2.1 2.1.3
Q6.						
a.	What are Einstein's coefficients? Explain. Also explain why stimulated emission should govern the absorption process so as to make LASER action more feasible?	8	5	4	2	1.2.1
b.	State divergence theorem. Find divergence and curl of the following $\overline{v_a} = x^2\hat{x} + 3xz^2\hat{y} - 2xz\hat{z}$	8	1	1	1,2	1.1.1 1.2.1
c.	Derive continuity equation from 4th Maxwell equation.	4	3	2	4	1.2.1 2.1.3
Q7.						
a.	Explain the procedure of construction and deconstruction methods used in Holography and also explain differences between photography and Holography.	8	5	1	2	1.2.1
b.	Light of wavelength 5893A° passes through a slit of width 0.5mm and forms a diffraction pattern on a screen placed at distance 1m from the slit. Calculate separation of the dark band on either side of the central maximum.	8	4	3	3	1.2.1
c.	Compare between Electrostatics and magnetostatics.	4	2	2	1	1.2.1

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Semester Examination for F.Y.BTech (Civil/Mechanical/Electrical)

PREVIOUS **Old Course**

Total marks: **75** Duration: **3 Hrs**

Class/Sem: **F.Y.BTech (C/M/E) Sem-II** Subject : **APPLIED PHYSICS-II**

Course code: **BT205**

- Attempt any FIVE questions out of SEVEN questions.
- **Answers to all sub questions should be grouped together.**
- Draw diagrams wherever necessary.
- Assume suitable data (if necessary) and state the assumption/s clearly!
- Figures to the right indicate full marks, course outcome number and module number respectively.

Good luck!

Q. No		Max Mark	CO	Module no.
1				
(a)	State the Fermi function in solids and hence define Fermi energy. Show that Fermi level lies at the centre of the forbidden gap for an intrinsic semiconductor. In a solid, there is an energy level lying 0.012eV below the Fermi level. What is the probability of this level being not occupied by electrons at room temperature?	8	CO4	V
(b)	Derive Gauss' law in integral and differential form and hence state the relationship between scalar potential and electrostatic field.	7	CO2	IV
2				
(a)	The distance between middle layer of the hcp cell and top layer just above the first hcp cell is 0.75nm. What is the length of the base diagonal? Draw the following: $(\bar{3}0\bar{2})$ and its direction in a simple cubic crystal.	4 4	CO1	I
(b)	Define the following: (i) Susceptibility and (ii) Magnetisation and hence give the relation for both. Diamagnetic Al_2O_3 is subjected to an external magnetic field of 105A/m. Evaluate magnetization and magnetic flux density in Al_2O_3. Given: susceptibility= $5x10^{-5}$.	2 5	CO2	IV
3				
(a)	Explain FCC structure using its unit cell properties.	8	CO1	I
(b)	Describe the spherical polar coordinate system and hence derive expressions for line, area and volume elements.	7	CO3	IV
4				
(a)	Define magnetic vector potential and hence derive an expression for the same. Find	8	CO3	IV

	the electric field at a distance z above the midpoint of a straight line segment of length 2L, which carries a uniform charge density λ. Reduce it to the form if we want to find for an infinite straight wire.			
(b)	Explain Bragg's law of X-ray diffraction. A sample of BCC iron was placed in an X-ray diffractometer using incoming X-rays with a wavelength of 0.1541 nm. Diffraction from the (110) planes was obtained at $2\theta=44.704^{\circ}$ for the first order. Calculate the value for lattice constant of BCC iron.	7	CO1	II
5				
(a)	Compute divergence and curl of the following function: $\overline{v_a} = (r\cos\theta)\hat{r} + (r\sin\theta)\hat{\theta} + (r\sin\theta\cos\phi)\hat{\phi}$	8	CO3	IV
(b)	Explain how Fermi level changes with doping in a P-type semiconductor.	7	CO4	V
6				
(a)	State and explain fundamental theorem of divergence. Check the divergence theorem for the following function: $\overline{v_1} = r^2\hat{r}$	8	CO3	IV
(b)	Derive Curie Weiss law. The Curie temperature of iron is 1043K. Calculate the (a) saturation magnetisation (b) Weiss field constant assuming there are 10^{28} atoms/m^3 having moments of two Bohr magneton per atom.	7	CO2	III
7				
(a)	State and Explain Hall effect. Calculate the current produced in a small germanium plate of area $1cm^2$ and of thickness 0.3mm, when a potential difference of 2V is applied across the faces. Given concentration of free electrons in germanium is $2x10^{19}/m^3$. The mobility of electrons is $0.36m^2$/V-s and of holes is $0.17m^2$/V-s.	8	CO4	V
(b)	Explain hysteresis in ferromagnetic materials using Hysteresis curve and hence explain terms in the curve.	7	CO2	III

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Previous Examinations for Academic Year 2017-18 Batch

Program: Civil/Mechanical/Electrical

Course Code: BS-BT201

Course Name: Engineering Mathematics II

Duration: 3 hours

Maximum Points: 100

Semester: II

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six questions.

Q.No.	Questions	Points	CO	BL	PI
1(a)	Find the length of the arc of the parabola $y^2 = 8x$ cut off by its latus rectum	6	4	ii, iii	1.1.1
1(b)	Prove that $\int_1^\infty \frac{1}{x^{p+1}(x-1)^q} dx = \beta(p+q, 1-q), \ -p < q < 1$	6	3	iv, v	2.4.1
1(c)	Solve $(D^2 - 3D + 2)y = e^x \sin\left(\frac{x}{2}\right)$	8	2	ii, v	2.4.1
2(a)	Solve $\left(2D^2 + 5D + 2\right)y = e^{-x} \sinh 2x$	6	2	i, ii	2.4.1
2(b)	Solve $2\frac{dy}{dx} + y \tan x = \frac{(4x+5)^2}{\cos x} y^3$	6	1	ii, iii	1.1.1
2(c)	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}}\, dx \cdot \int_0^{1/2} \sqrt{2y - 4y^2}\, dy$	8	3	ii, iii	1.1.1
3(a)	Solve $\left(D^4 + 4D^2\right)y = x^2 - 1$	6	2	i, ii	2.4.1
3(b)	Evaluate $\int_0^\infty \sqrt{x} e^{-x^2} dx \cdot \int_0^\infty \frac{e^{-x^2}}{\sqrt{x}} dx$	6	3	ii, iii	2.4.1
3(c)	Find the area outside the circle $r = a$ and inside the cardioide $r = a(1 + \cos\theta)$	8	4	iv, v	1.1.1

4(a)	Solve $(x+y)dx+(\tan x)dy=0$	6	1	i, ii	1.1 .1
4(b)	Evaluate $\iiint \frac{1}{(1+x+y+z)^3}dxdydz$ over the tetrahedron bounded by the planes $x=0$, $y=0$, $z=0$ and $x+y+z=1$	6	4	iv, v	2.4 .1
4(c)	Evaluate $\int_0^a \int_0^x \frac{e^y}{\sqrt{(a-x)(x-y)}}dxdy$ by changing the order of integration.	8	4	ii, iii	2.4 .1
5(a)	Find the total length of the curve: $\left(\frac{x}{a}\right)^{\frac{2}{3}}+\left(\frac{y}{b}\right)^{\frac{2}{3}}=1$.	6	3	i, ii	2.4 .1
5(b)	Evaluate $\iint xy(x+y)dxdy$, where R is the region bounded between $x^2=y$ & $x=y$	6	4	ii, iii	2.4 .1
5(c)	Prove that $\int_0^{\pi/2} \frac{\cos^{2m-1}\theta.\sin^{2n-1}\theta}{(a^2\cos^2\theta+b^2\sin^2\theta)^{m+n}}d\theta=\frac{\beta(m,n)}{2\cdot a^{2m}.b^{2n}}$	8	3	iv, v	1.1 .1
6(a)	Solve $\frac{1}{y^2}-\frac{2}{x}=\frac{2x}{y^3}\frac{dy}{dx}$	6	1	ii, v	1.1 .1
6(b)	Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} \sqrt{a^2-x^2-y^2}dxdy$	6	4	iv, v	2.4 .1
6(c)	Using method of variation of parameters, solve $(D^2+5D+6)y=e^{-2x}\sec^2 x(1+2\tan x)$	8	2	i, ii	1.1 .1
7(a)	Find the total length of the cardioid $r=a(1-\sin\theta)$	6	3	i, ii	1.1 .1
7(b)	Evaluate $\iint r\sin\theta dr d\theta$ over the area of the cardioid $r=a(1-\cos\theta)$	6	4	ii, iii	2.4 .1
7(c)	Solve $x^2\frac{d^2y}{dx^2}+2x\frac{dy}{dx}-20y=(x-3)^2$	8	2	ii, v	1.1 .1

29/301

SARDAR PATEL COLLEGE OF ENGINEERING

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

PREVIOUS SEM ■■-Examination

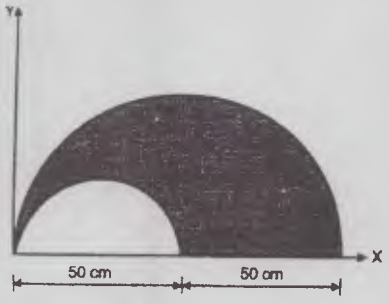
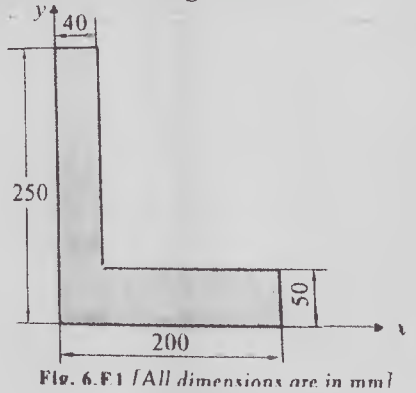
December 2019

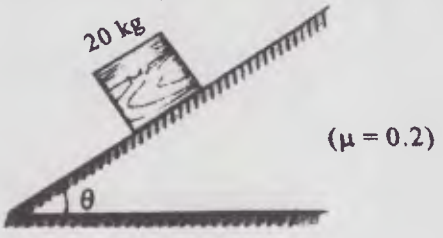
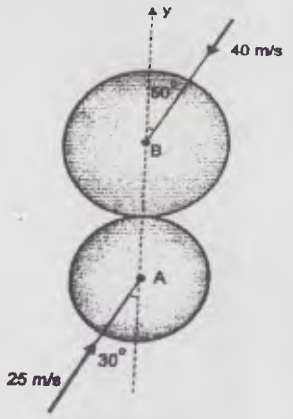
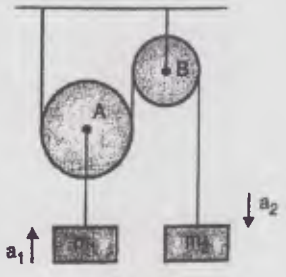
Program: F.Y. B.Tech (C/M/E) **Duration:** 03 hours

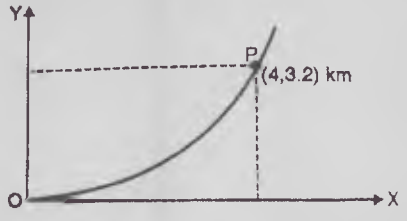
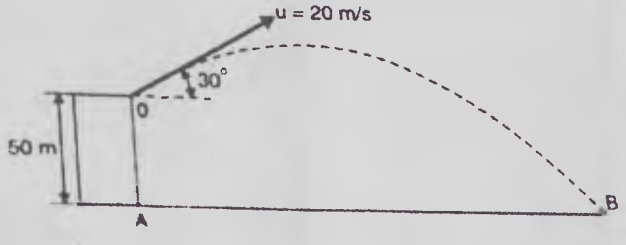
Course Code: ES-BT204 (New Course) **Maximum Points:** 100 marks

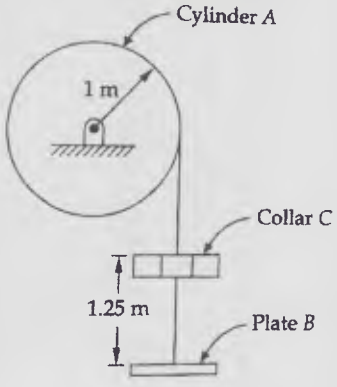
Course Name: Engineering Mechanics-I I **Semester:** II

Notes: 1. Attempt **any five** questions out of seven questions.
2. Figures to the right indicate full marks.
3. Assume suitable data wherever required and state it clearly.

Q.No.	Questions	Points	CO	BL	PI
Q.1.					
a)	Find the centroid of the shaded area of the semicircle of diameter 100 cm about x & y- axis as shown in **figure 1.**  **Figure 1.**	08	CO 1	L1, L2	1.3.1 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
b)	Find the moment of inertia about the centroidal axis for the figure shown in **figure 2.**  Fig. 6.F1 *[All dimensions are in mm]* **Figure 2.**	12	CO 1	L1, L2	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
Q.2.					
a)	A mass of 20 kg is projected up an inclined of 26° with velocity of 4 m/s as shown in **figure 3.** If μ = 0.25, i) Find maximum distance that the package	10	CO 3	L1, L2, L3, L4	1.3.1 , 2.1.1 ,

	will move along the plane and ii) What will be the velocity of the package when it comes back to initial position?  **Figure 3.**				2.1.2 , 2.1.3 , 2.2.2
b)	Two balls A (mass 3 kg) and B (mass 4 kg), are moving with velocities 25 m/s and 40 m/s respectively as shown in **figure 4.** Before impact, the direction of velocity of two balls are 300 and 500 with the line joining their centres. If the coefficient of restitution for the impact is 0.78, find the magnitude and the direction of the velocities of the balls after the impact.  **Figure 4.**	10	CO 3	L1, L2, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3
Q. 3.					
a)	Two masses are interconnected with the pulley system. Neglecting frictional effect of pulleys and cord, determine the acceleration of mass m_2. Take m_1 = 50 kg and m_2 = 40 kg.  **Figure 5.**	10	CO 3	L1, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
b)	Acceleration of a vehicle at any instant is given by the expression a = m/s², where v = velocity in m/s. If the vehicle starts from rest find its, i) Velocity when displacement is 200 m	10	CO 2	L2	2.1.1 , 2.1.2 ,

	ii) Displacement when velocity is 54 kmph				2.1.3 , 1.3.1
Q.4.					
a)	In Asian games, for 150 m event, an athlete accelerates uniformly from the start to his maximum velocity in a distance of 5 m and run the remaining distance with that velocity. If the athlete finishes the race in 12 sec, determine: i) His initial acceleration and ii) His maximum velocity.	10	CO 2	L1, L2	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
b)	An airplane travels on a curved path. At 'P' it has a speed of 360 kmph which is increasing at a rate of 0.5 m/s^2. Determine at P: i) Magnitude of total acceleration ii) Angle made by the acceleration vector with the positive x-axis.  **Figure 6.**	10	CO 2	L1, L4	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
Q.5.					
a)	A particle is projected from the top of a tower of height 50 m with a velocity of 20 m/sec at an angle of 30 degrees to the horizontal. Determine: i) Horizontal distance AB it travels from the foot of the tower. ii) The velocity with which it strikes the ground. iii) Total time taken to reach point B.  **Figure 7.**	12	CO 2	L1, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3
b)	An inextensible cord going around a homogeneous cylinder of mass 125 kg and radius 1 m holds a plate 'B' of negligible mass. A collar of 35 kg mass is released from rest in the position shown in **figure 8** and it drops on the plate.	08	CO 3	L1, L2	1.3.1 , 2.1.1 , 2.1.2

	What will be the velocity of the collar after it has descended an additional distance of 0.5 m after striking the plate? It may be presumed that there is no rebound, i.e. the plate and the collar move downwards locked together and chord remains taut.  **Figure 8.**				, 2.1.3
Q.6.					
a)	A motorcycle can accelerate at a maximum rate of 3 m/s^2. The maximum retardation possible is 4.5 m/s^2. The maximum velocity possible is 27 m/s. The rider starts from rest and wants to cover a distance of 1000 m and come to a halt. Find the minimum time required to do the same.	10	CO 2	L1, L2	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
b)	State and prove Work-Energy Principle. Also state the law of conservation of momentum.	10	CO 3	L3, L4	1.3.1
Q.7.					
a)	Water leaks from the ceiling 16 m high, at the rate of 5 drops per second. Find the distances between the first and the second drop when the first drop has just touched the ground.	12	CO 2	L2	2.1.1 , 2.1.2 , 2.1.3 , 1.3.1
b)	If a ball is thrown vertically down with a velocity of 10 m/s from a height of 3m, find the maximum height it can reach after hitting the floor, if the coefficient of restitution is 0.7	08	CO 3	L1, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3

**********GOOD LUCK**********

(1)

BharatiyaVidyaBhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.

End-Sem-II (KT-Exam)
Dec 2019

Max. Marks: **75 marks** Duration: **180 Min**
Class: F.Y B.TECH **C/M/E** Semester: **II** Program:
Name of the Course: **Applied Chemistry –II** Course Code : [illegible]-BT-206

Instructions:

1 Question **No** (Q1) is compulsory
2 Attempt any 3 from Q2Q3 Q4 Q5 Q6

Que. No	Question	Points	CO	BL	PI
Q1					
a	A Coal sample contain following composition by weight C= 82%, H=4%,O=6%, S=9%,N=3% and Ash=5% calculate gross and net calorific value	5	3	3	3.2.1
6	Calculate the Atom Economy for following reaction CH_3NH_2 + COCl ---------→ CH_3-N=C=O + 2HCl	5	4	3	3.2.1
c	5.0 g of air dried coal sample taken in silica crucible, after heating it in an electric oven at 110 ^{0}Cfor hr. the residue was weighed 2.75 g. The residue was heated in silica crucible covered with vented lid at a temperature 925 ^{0}C for exactly 7 min. after cooling the weight of residue was found to contain 2.5 .the residues was ignited to constant weight 0.346g. Find out the % moisture content, % volatile matter content, % ash content and % fix carbon content in a sample	5	1	1	3.2.1
Q2					
a	Explain 12 Principal of green chemistry.	10	4	2	2.2.3
b	Explain derivatization of chemical reaction should be avoided	5	2	2	2.2.3
c	Explain green solvents for chemical reaction	5	2	2	2.2.3
Q3					
a	Explain determination Carbon content Ultimate analysis with its significance	10	3	2	2.2.3

b	Write short note on Octane value of petrol fuel	5	3	1	1,2,1
c	Explain limitations of direct use vegetable oil as fuel	5	3	1	1,2,1
Q4					
a	Explain dry corrosion with suitable reaction, diagram and mechanism	10	1	1	2,2,3
b	Write difference between electrochemical and galvanic series	5	1	1	1,2,1
c	Explain pitting corrosion	5	1	1	2,2,3
Q5					
a	Write short note distillation of crude petroleum Explain cracking of crude petroleum and difference between thermal and catalytic cracking	10	3	1	2,2,3
b	Define fuel and explain gross and net calorific value	5	3	1	1,2,1
c	What are antiknocking agents? Explain its role Diesel	5	3	2	2,2,3

17/19/45/48

50/-

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Semester Examination for F.Y.BTech (Civil/Mechanical/Electrical)

PREVIOUS **Old Course**

Total marks: **75** Duration: **3 Hrs**

Class/Sem: **F.Y.BTech (C/M/E) Sem-II** Subject : **APPLIED PHYSICS-II**

Course code**: BT205**

- Attempt any FIVE questions out of SEVEN questions.
- **Answers to all sub questions should be grouped together.**
- Draw diagrams wherever necessary.
- Assume suitable data (if necessary) and state the assumption/s clearly!
- Figures to the right indicate full marks, course outcome number and module number respectively.

Good luck!

Q. No		Max Mark	CO	Module no.
1				
(a)	State the Fermi function in solids and hence define Fermi energy. Show that Fermi level lies at the centre of the forbidden gap for an intrinsic semiconductor. In a solid, there is an energy level lying 0.012eV below the Fermi level. What is the probability of this level being not occupied by electrons at room temperature?	8	CO4	V
(b)	Derive Gauss' law in integral and differential form and hence state the relationship between scalar potential and electrostatic field.	7	CO2	IV
2				
(a)	The distance between middle layer of the hcp cell and top layer just above the first hcp cell is 0.75nm. What is the length of the base diagonal? Draw the following: $(\bar{3}02)$ and its direction in a simple cubic crystal.	4 4	CO1	I
(b)	Define the following: (i) Susceptibility and (ii) Magnetisation and hence give the relation for both. Diamagnetic Al_2O_3 is subjected to an external magnetic field of 105A/m. Evaluate magnetization and magnetic flux density in Al_2O_3. Given: susceptibility= $5x10^{-5}$.	2 5	CO2	IV
3				
(a)	Explain FCC structure using its unit cell properties.	8	CO1	I
(b)	Describe the spherical polar coordinate system and hence derive expressions for line, area and volume elements.	7	CO3	IV
4				
(a)	Define magnetic vector potential and hence derive an expression for the same. Find	8	CO3	IV

	the electric field at a distance z above the midpoint of a straight line segment of length 2L, which carries a uniform charge density λ. Reduce it to the form if we want to find for an infinite straight wire.			
(b)	Explain Bragg's law of X-ray diffraction. A sample of BCC iron was placed in an X-ray diffractometer using incoming X-rays with a wavelength of 0.1541 nm. Diffraction from the (110) planes was obtained at $2\theta=44.704^{\circ}$ for the first order. Calculate the value for lattice constant of BCC iron.	7	CO1	II
5				
(a)	Compute divergence and curl of the following function: $\overline{v_a} = (r\cos\theta)\hat{r} + (r\sin\theta)\hat{\theta} + (r\sin\theta\cos\phi)\hat{\phi}$	8	CO3	IV
(b)	Explain how Fermi level changes with doping in a P-type semiconductor.	7	CO4	V
6				
(a)	State and explain fundamental theorem of divergence. Check the divergence theorem for the following function: $\overline{v_1} = r^2\hat{r}$	8	CO3	IV
(b)	Derive Curie Weiss law. The Curie temperature of iron is 1043K. Calculate the (a) saturation magnetisation (b) Weiss field constant assuming there are 10^{28} atoms/m^3 having moments of two Bohr magneton per atom.	7	CO2	III
7				
(a)	State and Explain Hall effect. Calculate the current produced in a small germanium plate of area $1cm^2$ and of thickness 0.3mm, when a potential difference of 2V is applied across the faces. Given concentration of free electrons in germanium is $2x10^{19}/m^3$. The mobility of electrons is $0.36m^2$/V-s and of holes is $0.17m^2$/V-s.	8	CO4	V
(b)	Explain hysteresis in ferromagnetic materials using Hysteresis curve and hence explain terms in the curve.	7	CO2	III

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

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

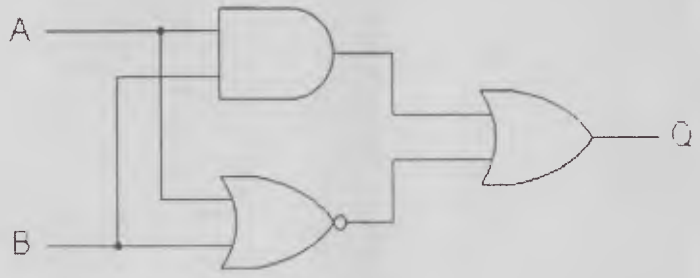
Previous Semester Examination December 2019

Program: C/M/E
Course code: ES-BT202
Name of the Course: Basic Electronics Engineering

Duration: 3 Hour
Maximum Marks: 100
Semester: II

Q. 1 is compulsory.
Solve any four questions out of remaining six.

Q. No.		Points	CO	BL	PI
1 A (i)	What should be the value of inductance in an inductor filer connected to FWR operating at 60 Hz if ripple is not to exceed 5% for 100 Ω load.	2	2	3	1.3.1
(ii)	A transistor has a β_{dc} of 250 and a base current I_B of 20 μA. Determine the collector current I_C.	2	1	3	1.3.1
(iii)	For a FWR with π filter to provide 9V at 200mA and ripple is limited to 2 %. Given that $C_1 = C_2 = 25\mu$ F. Determine value of L	2	2	3	1.3.1
(iv)	Even though gain is less, JFET is used as an amplifier. Why?	2	1	2	1.3.1
(v)	Simplify : AB + BC (B + C)	2	4	3	1.3.1
1 B (i)	Draw the circuit diagram using opamp to give $V_o = V_{in}$. What is the application of this circuit?	2	3	1	1.3.1
(ii)	For an ideal op-amp what are the values of input resistance and output resistance.	2	3	1	1.3.1
(iii)	State commutative law with respect to Boolean algebra	2	3	1	1.3.1
(iv)	Draw equivalent circuit of op amp.	2	3	1	1.3.1
(v)	Determine expression for the output Q in terms of inputs A,B	2	4	3	1.3.1



2A	Explain different regions with respect to CE BJT characteristics.	10	1	2	1.3.1
2B	Explain following statements with respect to neat diagrams of BJT. CE configuration is more commonly used as amplifer. CC configuration is more commonly used as buffer.	10	1	2	1.3.1

3A	With respect to JFET characteristics explain I_{DSS}, g_m	10	1	3	1.3.1
B	Explain working of FET as an amplifier	10	1	1	1.3.1
4	Draw the circuit diagram. Select proper component to get output Vo. Explain the same.		3	1, 4	1.3.1
A	$V_o = -(4V_1 + 5V_2)$	10			
B	$V_o = (V_1 - V_2)$	10			
5A	Simplify and realize with NAND only	10	4	3	1.3.1
(i)	$(A + B)(A + \overline{B})(\overline{A} + C)$				
(ii)	$XY + XYZ + XYZL + XYZLM + XYZLMP$				
B	Simplify and realize with NOR only	10	4	3	1.3.1
(i)	$P\overline{Q}\overline{R}\overline{S} + \overline{P}Q\overline{R}\overline{S} + Q\overline{R}S$				
(ii)	$(\overline{AB})(\overline{A} + B)(\overline{B} + B)$				
6A (i)	A FWR with center tapped transformer (10-0-10) (rms) supplies a load current of 100 mA. Supply frequency is 50 Hz. Neglecting the diode forward resistance and secondary winding resistance find (i) DC output voltage (ii) PIV of each diode (iii) Ripple frequency (iv) Ripple factor (v) Rectification efficiency	5	2	3	1.3.1
(ii)	Zener characteristic in forward bias is similar to that of normal pn junction diode. Say True/False. Justify.	5	2	3	1.3.1
B	In simple zener regulator circuit, V_{supply} = 40 V, R_s = 5 KΩ, R_L = 10 KΩ. Zener ratings are V_Z = 12 V and P_{Zmax} = 0.5 W. Draw neat circuit diagram and calculate (i) Current supplied by the battery (ii) load current (iii) Current through zener How will these values be affected if supply voltage increases to 70 V? Comment on the result.	10	1	3	1.3.1
7A	What is meant by universal gates? Why are they so called? Explain with relevant circuit diagrams.	10	4	1	1.3.1
B	Explain following opamp chara. BW = Infinity CMRR = Infinity	10	3	1	1.3.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Previous Examinations for Academic Year 2018-19 Batch

Program: Civil/Mechanical/Electrical

Course Code: BS-BT201

Course Name: Engineering Mathematics II

Duration: 3 hours

Maximum Points: 100

Semester: II

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six questions.

Q.No.	Questions	Points	CO	BL	PI
1(a)	Find the length of the arc of the parabola $y^2 = 8x$ cut off by its latus rectum	6	4	ii, iii	1.1.1
1(b)	Prove that $\int_1^\infty \frac{1}{x^{p+1}(x-1)^q} dx = \beta(p+q, 1-q), \ -p < q < 1$	6	3	iv, v	2.4.1
1(c)	Solve $(D^2 - 3D + 2)y = e^x \sin\left(\frac{x}{2}\right)$	8	2	ii, v	2.4.1
2(a)	Solve $\left(2D^2 + 5D + 2\right)y = e^{-x} \sinh 2x$	6	2	i, ii	2.4.1
2(b)	Solve $2\frac{dy}{dx} + y \tan x = \frac{(4x+5)^2}{\cos x} y^3$	6	1	ii, iii	1.1.1
2(c)	Evaluate $\int_0^1 \sqrt{1-\sqrt{x}}\, dx \cdot \int_0^{1/2} \sqrt{2y - 4y^2}\, dy$	8	3	ii, iii	1.1.1
3(a)	Solve $\left(D^4 + 4D^2\right)y = x^2 - 1$	6	2	i, ii	2.4.1
3(b)	Evaluate $\int_0^\infty \sqrt{x} e^{-x^2} dx \cdot \int_0^\infty \frac{e^{-x^2}}{\sqrt{x}} dx$	6	3	ii, iii	2.4.1
3(c)	Find the area outside the circle $r = a$ and inside the cardioide $r = a(1 + \cos\theta)$	8	4	iv, v	1.1.1

4(a)	Solve $(x+y)dx+(\tan x)dy=0$	6	1	i, ii	1.1 .1
4(b)	Evaluate $\iiint \frac{1}{(1+x+y+z)^3}dxdydz$ over the tetrahedron bounded by the planes $x=0,\ y=0,\ z=0$ and $x+y+z=1$	6	4	iv, v	2.4 .1
4(c)	Evaluate $\int_0^a \int_0^x \frac{e^y}{\sqrt{(a-x)(x-y)}}dxdy$ by changing the order of integration.	8	4	ii, iii	2.4 .1
5(a)	Find the total length of the curve: $\left(\frac{x}{a}\right)^{\frac{2}{3}}+\left(\frac{y}{b}\right)^{\frac{2}{3}}=1.$	6	3	i, ii	2.4 .1
5(b)	Evaluate $\iint xy(x+y)dxdy$, where R is the region bounded between $x^2=y$ & $x=y$	6	4	ii, iii	2.4 .1
5(c)	Prove that $\int_0^{\pi/2} \frac{\cos^{2m-1}\theta.\sin^{2n-1}\theta}{(a^2\cos^2\theta+b^2\sin^2\theta)^{m+n}}d\theta=\frac{\beta(m,n)}{2\cdot a^{2m}.b^{2n}}$	8	3	iv, v	1.1 .1
6(a)	Solve $\frac{1}{y^2}-\frac{2}{x}=\frac{2x}{y^3}\frac{dy}{dx}$	6	1	ii, v	1.1 .1
6(b)	Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} \sqrt{a^2-x^2-y^2}dxdy$	6	4	iv, v	2.4 .1
6(c)	Using method of variation of parameters, solve $(D^2+5D+6)y=e^{-2x}\sec^2 x(1+2\tan x)$	8	2	i, ii	1.1 .1
7(a)	Find the total length of the cardioid $r=a(1-\sin\theta)$	6	3	i, ii	1.1 .1
7(b)	Evaluate $\iint r\sin\theta dr d\theta$ over the area of the cardioid $r=a(1-\cos\theta)$	6	4	ii, iii	2.4 .1
7(c)	Solve $x^2\frac{d^2y}{dx^2}+2x\frac{dy}{dx}-20y=(x-3)^2$	8	2	ii, v	1.1 .1

33135-136

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Exam(December 2019)

Max. Marks: 100 Duration: 3 hours
Class: F.Y.B.Tech Semester:II Program: (C/M/E)
Name of the Course : Computer Programming
Course Code : ES-BT207

Instructions:

- Attempt any FIVE out of the SEVEN Questions.
- Assume suitable data wherever necessary.

Q. No.			Points	CO	BL	PI
1.	A	Write a program to check whether the entered string is palindrome or not without using strrev() function	10	2	3	2.1.2
	B	Explain Break and Continue statement with an example.	10	1	2	1.4.1
2.	A	Write a program to find transpose of a matrix.	10	2	3	2.1.2
	B.	Describe different types of inheritance and explain single inheritance with an example.	10	3	2	1.4.1
3.	A	Write a program to find largest of 3 numbers using function.	10	2	3	2.1.2
	B	Draw a flow chart to find sum of 1st 50 even numbers	10	1	3	2.1.2
4.	A	Write a menu driven program to do addition, subtraction, and multiplication of two numbers.	10	1	3	2.1.2
	B	Write a short note on operators supported by C++.	10	1	2	1.4.1
5.	A	What is recursion? Write a program to find factorial of a number using recursion.	10	2	2	1.4.1
	B	Differentiate between for loop and while loop with suitable examples.	10	1	2	1.4.1
6	A	Write a program to find GCD and LCM of two numbers using concept of OOPs.	10	3	3	2.1.2

6.	B	Write a program to print the following patterns i. 1 2 3 4 5 6 7 8 9 10 ii. 1 1 1 1 2 2 2 3 3 4	10	2	3	2.1.2
7.		Write Short Note on any four i. Constructors ii. Function overloading iii. Character set iv. Local and global variables v. Polymorphism	20	2,3	2	1.4.1

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Exam(December 2019)

Max. Marks: 100 Duration: 3 hours
Class: F.Y.B.Tech Semester:II Program: (C/M/E)
Name of the Course : Computer Programming
Course Code : BT207

Instructions:

- Attempt any FIVE out of the SEVEN Questions.
- Assume suitable data wherever necessary.

Q. No.			Points	CO	BL	PI
1.	A	Write a program to add first five natural numbers using function	10	2	3	2.1.2
	B	Explain Passing by reference and passing by value with examples	10	2	2	1.4.1
2.	A	Write a program to subtract two matrices.	10	2	3	2.1.2
	B.	Explain any four string library functions with suitable examples.	10	2	2	1.4.1
3.	A	Write a program using functions to find whether the entered number is Armstrong's number or not.	10	2	3	2.1.2
	B	Write an algorithm to find sum of 1st 50 even numbers	10	1	3	2.1.2
4.	A	Write a program to find if the entered number is even or odd using switch.	10	1	3	2.1.2
	B	What are the various visibility specifiers? When do we assign the protected visibility specifier to a class member? Explain with example.	10	3	2	1.4.1
5.	A	Write a short note on Datatypes supported by C++.	10	1	2	1.4.1
	B	Differentiate between for loop and do while loop with suitable examples.	10	1	2	1.4.1
6	A	Write a program to find GCD and LCM of two numbers using concept of OOPs.	10	3	3	2.1.2

6.	B	Write a program using functions to print the following * * * * * * * * * *	10	2	3	2.1.2
7.		Write Short Note on any three i. Single inheritance ii. Operators iii. Features of OOPs iv. Polymorphism	20	1,2,3	2	1.4.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

PREVIOUS SEMESTER [redacted] Exam

December 2019

(Old Course)

Program: F.Y. B.Tech (C/M/E)

Course Code: BT204

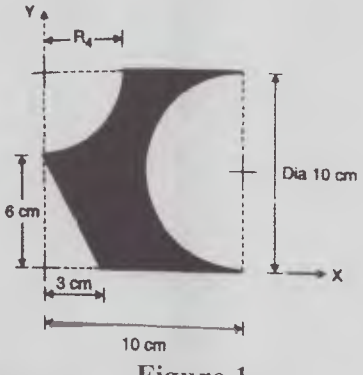
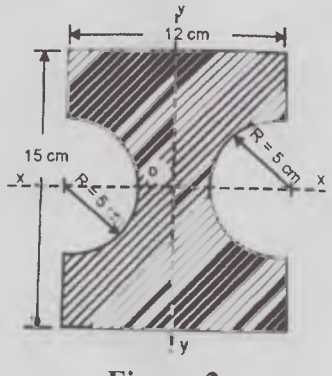
Course Name: Engineering Mechanics-II

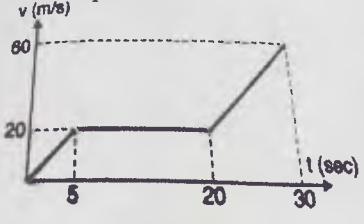
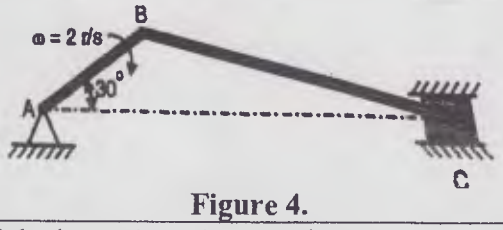
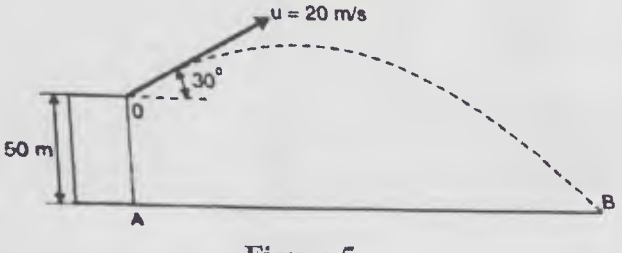
Duration: 03 hours

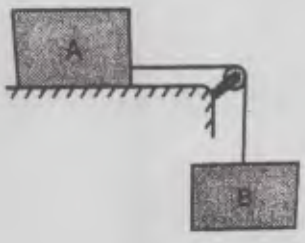
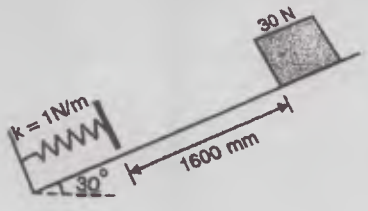
Maximum Points: 100 marks

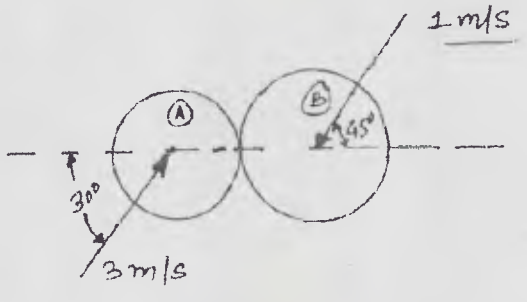
Semester: II

Notes: 1. Attempt **any five** questions out of seven questions.
2. Figures to the right indicate full marks.
3. Assume suitable data wherever required and state it clearly.

Q.No.	Questions	Points	CO	BL	PI
Q.1.					
a)	Find the centroid of the shaded area shown in **figure 1.**  **Figure 1.**	10	CO1	L1, L2	1.3.1 2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	For the shaded figure shown, find: i) Moment of inertia about centroidal axis ii) Polar Moment of Inertia about an axis through 'O'.  **Figure 2.**	10	CO1	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
Q.2.					
a)	A stone is dropped from the top of a tower. When it	08	CO2	L1,	1.3.1,

	from a point 38 m below the top of the tower. If both the stones reach the ground at the same time, calculate: i) The height of the tower and ii) The velocity of the stones when they reach the ground.				2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	Velocity-time diagram for a particle travelling along a straight line is shown in **figure 3.** Draw the acceleration –time and displacement-time diagram for the particle. Also find the important values of acceleration and displacement.  **Figure 3.**	12	CO 2	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
Q. 3.					
a)	**Figure 4** shows a crank and connecting rod mechanism. The crank AB rotates with an angular velocity of 2 rad/sec in clockwise direction. Determine the angular velocity of the connecting rod BC and the velocity of the piston C using ICR method. AB = 0.3 m and CB = 0.8 m.  **Figure 4.**	10	CO 2	L1, L4	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	A particle is projected from the top of a tower of height 50 m with a velocity of 20 m/sec at an angle of 30 degrees to the horizontal. Determine: i) Horizontal distance AB it travels from the foot of the tower. ii) The velocity with which it strikes the ground. iii) Total time taken to reach point B.  **Figure 5.**	10	CO 2	L1, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3

Q. 4.					
a)	A body of mass 25 kg resting on a horizontal table is connected by string passing over a smooth pulley at the edge of the table to another body of mass 3.75 kg and hanging vertically as shown. Initially, the friction between the mass A and the table is just sufficient to prevent the motion. If an additional 1.25 kg is added to the 3.75 kg mass, find the acceleration of the masses.  **Figure 6.**	10	CO3	L1, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	A flywheel has an initial angular speed of 3600 rev/min in clockwise direction. When a constant turning moment was applied to the wheel, it got subjected to a uniform anticlockwise angular acceleration of 3 rev/sec^2. Determine the angular velocity of the wheel after 20 seconds and total revolutions made during this period.	10	CO3	L1, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
Q.5.					
a)	A car starts from rest and moves along a circular path having a radius of 20 m. Its speed increases at a uniform rate of 0.5 m/s^2. Find the time from the start and distance travelled when its resultant acceleration becomes 1.5 m/s^2.	10	CO2	L1, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3
b)	State and prove Work-Energy Principle.	10	CO3	L3, L4	1.3.1
Q.6.					
a)	A 30 N block is released from rest. It slides down a rough incline having coefficient of friction 0.25. Determine the maximum compression of the spring.  **Figure 7.**	10	CO3	L1, L2, L3, L4	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2

b)	Two cars A and B start from rest at the same instant and move towards the right with acceleration 1.2 m/s² and 0.9 m/s² respectively. At the start, car A is trailing behind car B by 15 m. Find the time after which car A would overtake car B.	10	CO 2	L1, L2, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3 , 2.2.2
Q.7.					
a)	Define the following: i) Line of Impact ii) Instantaneous centre of rotation (ICR) iii) Direct and Oblique Central Impact iv) D-Alembert's Principle	04	CO 3 & CO 2	L3, L4	1.3.1 , 2.1.1 ,
b)	A stone dropped into a well is heard to strike the water in 4 seconds. Find the depth of the well assuming the velocity of sound to be 335 m/s.	06	CO 2	L2	2.1.1 , 2.1.2 , 2.1.3 , 1.3.1
b)	Two smooth balls collide as shown in **figure 8.** If mass of ball 'A' is 1kg and that of 'B' is 2 kg and coefficient of restitution 'e' = 0.75, find the velocities of balls after impact.  **Figure 10.**	10	CO 3	L1, L2, L3	1.3.1 , 2.1.1 , 2.1.2 , 2.1.3

**********GOOD LUCK**********

18 / 43,44,46, 47, 48

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Examination for F.Y.B Tech (Civil/Mechanical/Electrical)

PREVIOUS SEMESTER, Even Semester

New Course

Total Marks: **100** Duration: **3 Hrs**

CLASS/SEM : **F.Y.B Tech (C/M/E) Sem.-II**

COURSE NAME : **APPLIED PHYSICS-II**

COURSE CODE: **BSBT205**

- **Question No 1 is compulsory.**
- **Answer any FIVE out of SEVEN questions.**
- **Diagrams have to be drawn wherever necessary.**
- **Assume suitable data (if necessary) and state your assumptions clearly.**

Good luck!

		Mark	Module	CO	BL	PI
Q1.						
a.	Deduce Gauss' law in integral form from its differential form.	8	1	1	1	1.2.1 1.1.1
b.	Derive an expression for resolving power of a diffraction grating. Calculate the minimum number of lines in a grating which will just resolve in the first order the lines whose wavelengths are 5048A° and 5016 A°.	8	4	1	1	1.2.1 1.1.1
c.	When current flows down a wire, work is done, which shows up as Joule heating of the wire. Using Poynting's theorem, find the energy per unit time delivered to the wire assuming the electric field to be uniform.	4	3	1	2	1.2.1
Q2.						
a.	Derive line, area and volume elements for spherical polar coordinate system.	8	1	1,2	2	1.1.1 1.2.1
b.	Derive an expression for path difference between reflected rays in thin films of uniform thickness. White light is incident on a soap film at an angle $\sin^{-1}(4/5)$ and the reflected light is observed using a spectroscope. It is found that consecutive dark bands correspond to wavelengths 6.1×10^{-7}m and 6.0×10^{-7}m. If the refractive index of the film is 4/3, calculate its thickness.	8	4	3	2	1.2.1
c.	A He-Ne laser operates with a current of 10mA at a DC voltage of 2500V and gives an optical output of 5mW. Calculate its efficiency.	4	5	4	3	2.1.3
Q3.						
a.	Define magnetic vector potential and hence derive an expression for the same. Explain the differences between scalar potential in electrostatics with vector potential.	8	2	1,2	1,3	1.1.1 1.2.1
b.	State and explain Poynting theorem. Calculate the work done in the power transmission with E and H given by 50 and 65 respectively. The velocity of propagation is 20m/s.	8	3	2	4	1.2.1 2.1.3
c.	A plane transmission grating produces an angular separation of 0.01radian between two wavelengths observed at an angle 30°. Given mean value of the wavelength as 5000A°, calculate the difference in	4	4	3	3	1.2.1

	two wavelengths if the spectrum is observed in the second order.					
Q4.						
a.	Derive electromagnetic wave equations in vacuum from Maxwell's equations and hence trace the electric and magnetic fields assuming they are polarized along X-direction (OR propagating along Z-direction).	8	3	2	2	1.2.1
b.	Write a note on construction and working of NdYAG laser.	8	5	4	2	1.2.1
c.	Find the electric field at a distance z above the midpoint of a straight line segment of length 2L, which carries a uniform charge density λ. Reduce it to the form if we want to find for an infinite straight wire.	4	1	1	1	1.1.1 1.2.1
Q5.						
a.	State the intensity distribution expression when light gets diffracted through a double slit and hence explain the conditions for maxima, minima and secondary maxima.	8	4	3	1,2	1.2.1
b.	Calculate the potential inside and outside a spherical shell of radius R which carries a uniform surface charge. Set the reference point at infinity.	8	1	1	3	1.1.1 2.1.3
c.	Calculate the angular spread of a laser beam of wavelength 6930A° due to diffraction, if the beam emerges through a 3mm diameter mirror. How large would be the diameter of this beam when it is incident on a satellite 300km above earth?	4	5	4	3	1.2.1 2.1.3
Q6.						
a.	What are Einstein's coefficients? Explain. Also explain why stimulated emission should govern the absorption process so as to make LASER action more feasible?	8	5	4	2	1.2.1
b.	State divergence theorem. Find divergence and curl of the following $\overline{v_a} = x^2\hat{x} + 3xz^2\hat{y} - 2xz\hat{z}$	8	1	1	1,2	1.1.1 1.2.1
c.	Derive continuity equation from 4th Maxwell equation.	4	3	2	4	1.2.1 2.1.3
Q7.						
a.	Explain the procedure of construction and deconstruction methods used in Holography and also explain differences between photography and Holography.	8	5	1	2	1.2.1
b.	Light of wavelength 5893A° passes through a slit of width 0.5mm and forms a diffraction pattern on a screen placed at distance 1m from the slit. Calculate separation of the dark band on either side of the central maximum.	8	4	3	3	1.2.1
c.	Compare between Electrostatics and magnetostatics.	4	2	2	1	1.2.1

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

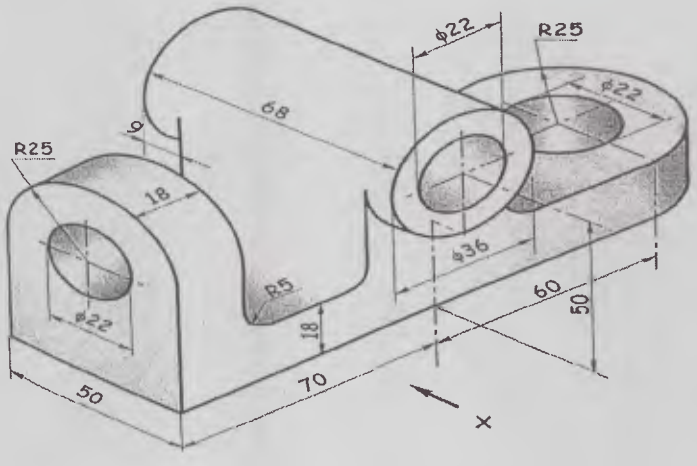
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Re-Examinations
December 2019 (SET B)

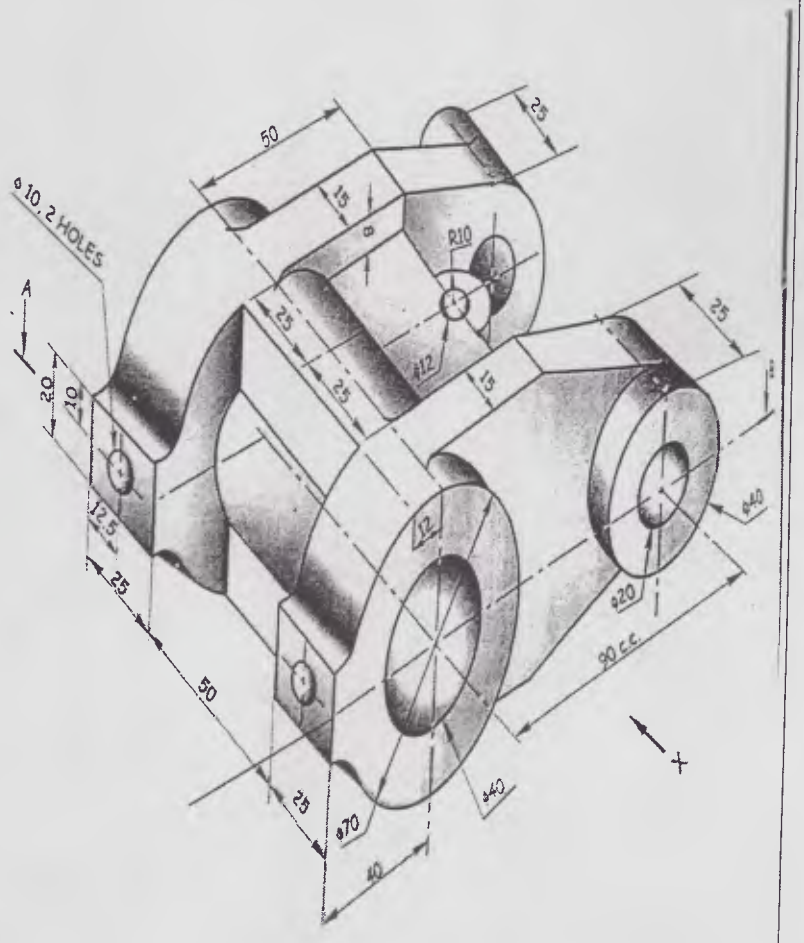
Max. Marks:100 Duration: 3HR
Class: F.Y.B.Tech(C/E/M) Semester: II
Program: FIRST YEAR ENGINEERING
Name of the Course:
Engineering Graphics-II
Course Code : BT203

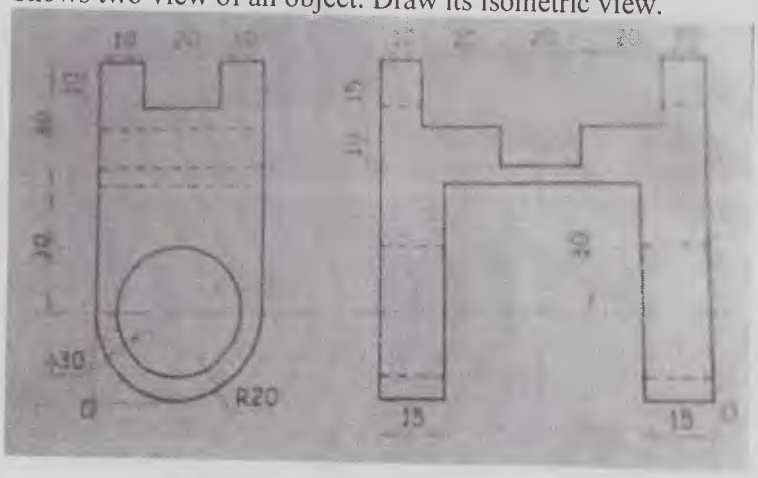
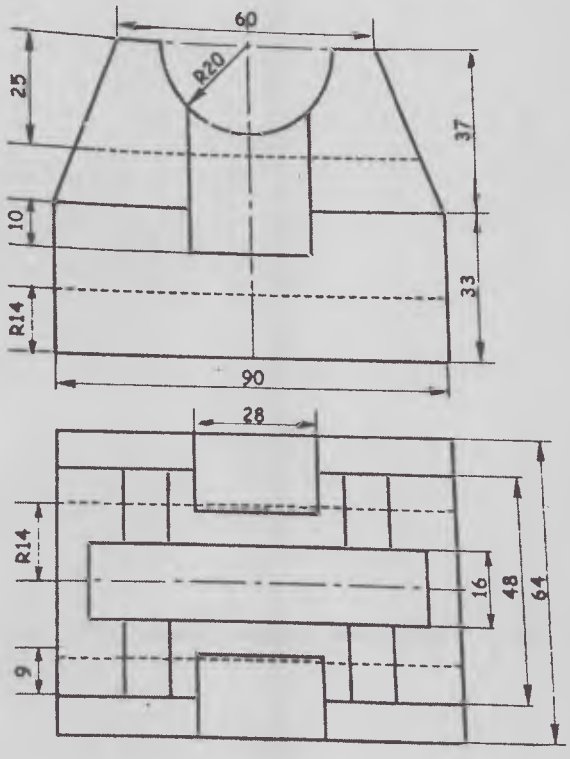
Exam Seat No	
Reg.NO.	
Machine NO.	
Sign of Invigilator	

Instructions:

1. All Questions are compulsory.
2. Draw neat diagrams.
3. Assume suitable data if necessary and clearly indicate the same.
4. Use only **First angle projection** method.

Question No		Maximum Marks	CO NO	Module No.
Q1	Draw the following orthographic projection view of figure 1}FRONT VIEW 2} TOP VIEW 3} LHSV 	20	1,4	2

Q2.	Draw the following views by the first angle method of projection 1] A front view along the direction of an arrow X. 2] A sectional top view on section plane A-B 3]LHSV  	20	1,4	3

Q3	Shows two view of an object. Draw its isometric view. 	20	2,4	4,5
Q4	Shows two views of an object. Draw the given views and draw the missing LHSV. 	20	3,4	6
Q5	(A) Draw any two type of nut with suitable dimension.	10	4	7
	(B) Draw any two type of stud with suitable dimension.	10	4	7

01/97

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

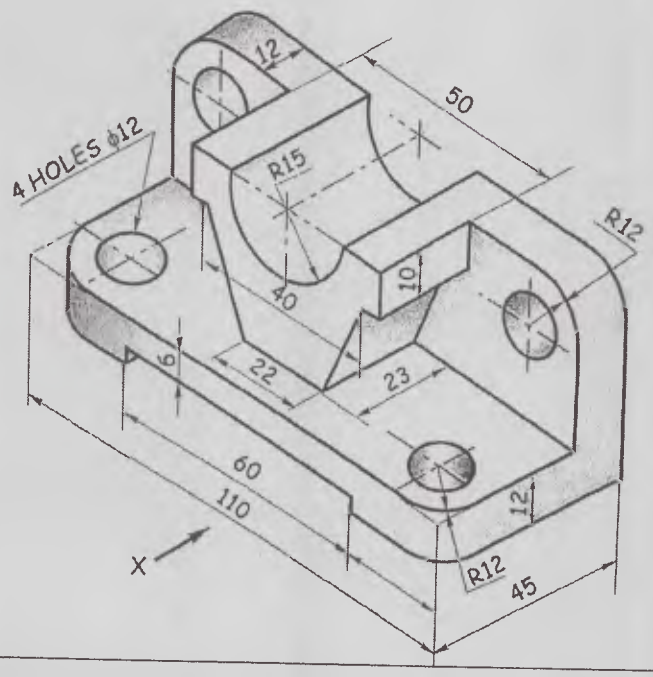
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Re-Examinations
December 2019 (SET A)

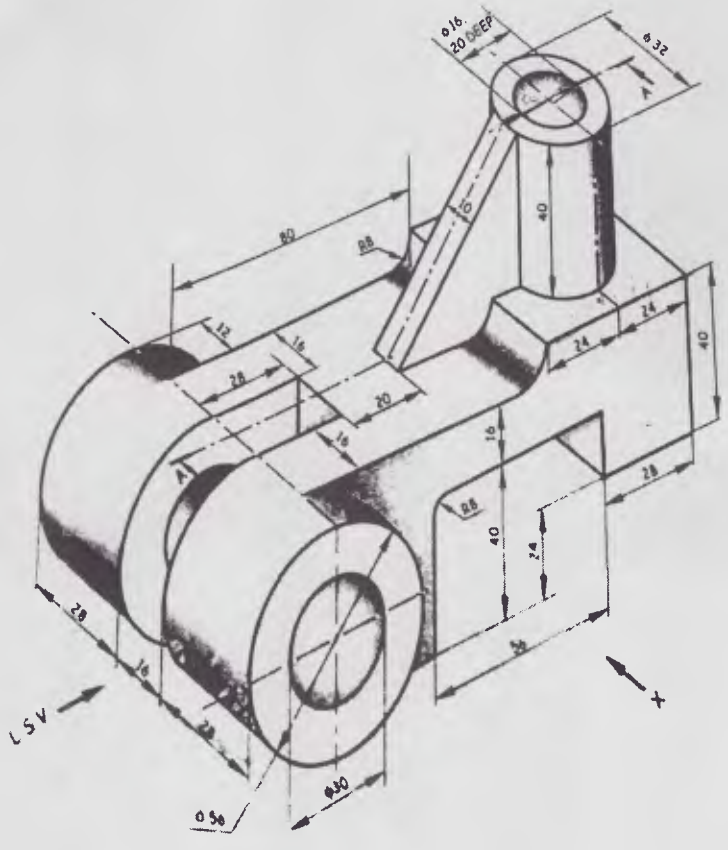
Max. Marks:100 Duration: 3HR
Class: F.Y.B.Tech(C/E/M) Semester:II
Program: FIRST YEAR ENGINEERING
Name of the Course:
Engineering Graphics-II
Course Code : BT203

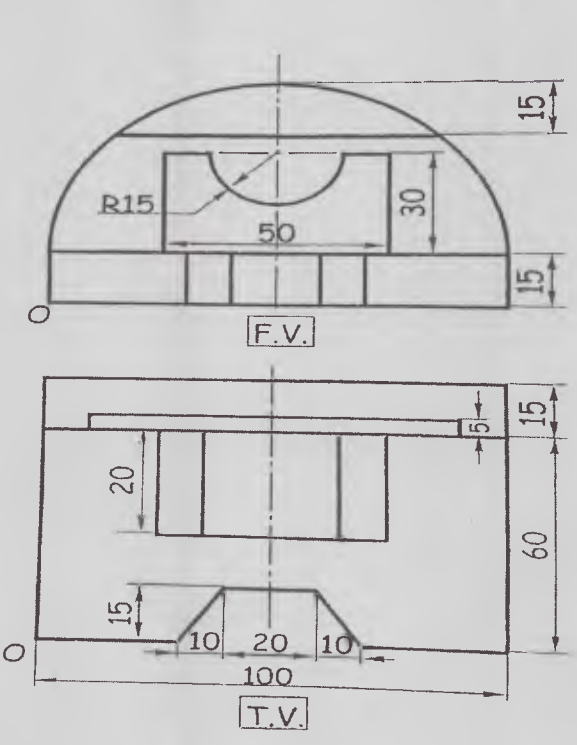
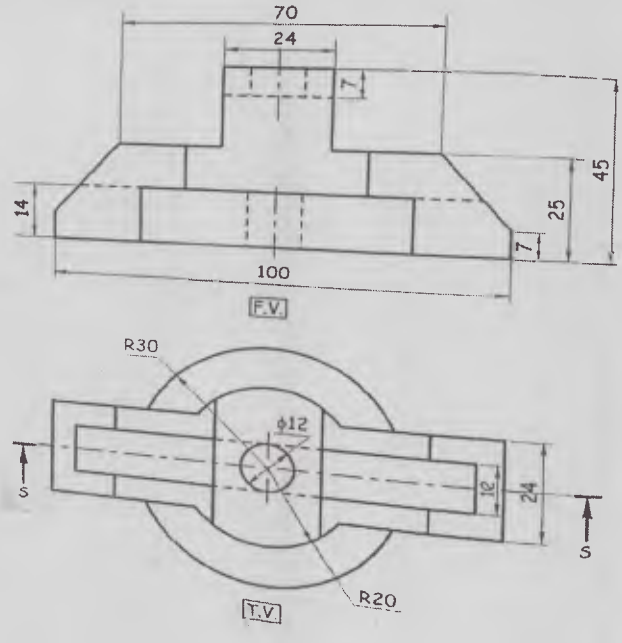
Exam Seat No	
Reg.NO.	
Machine NO.	
Sign of Invigilator	

Instructions:

1. All Questions are compulsory.
2. Draw neat diagrams.
3. Assume suitable data if necessary and clearly indicate the same.
4. Use only **First angle projection** method.

Question No		Maximum Marks	CO NO	Module No.
Q1	Draw the following orthographic projection view of figure 1 1}FRONT VIEW 2} TOP VIEW 3} RHSV  	20	1,4	2

Q2.	Draw the following views by the first angle method of projection 1]sectional front view along the direction of an arrow X and the section along A-A 2] Top view 3]LHSV  	20	1,4	3

Q3	Shows two view of an object. Draw its isometric view with O as origin. 	20	2,4	5
Q4	Shows the front view and TV of an object. Draw 1] sectional front view along section S-S. 2]TV 3]L.H.S.V 	20	3,4	6
Q5	(A) Draw any two type of bolt with suitable dimension.	10	4	7
	(B) Draw any two type of screw with suitable dimension.	10	4	7